A

Complete Course in Canning

THE ROYAL SOCIETY

FOR THE PROMOTION

OF HEALTH

Founded 1876

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HISTORICAL

A COMPLETE COURSE IN CANNING

BEING A THOROUGH EXPOSITION OF THE BEST, PRACTICAL METHODS OF HERMETICALLY SEALING CANNED FOODS, AND PRESERVING FRUITS AND VEGETABLES.

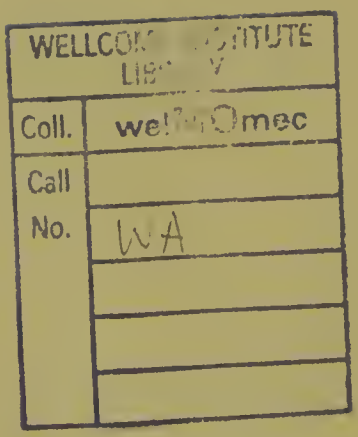
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Revised Up to Date.

THIRD EDITION.

Revised 1914.


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From
the Press
of
"The
Canning
Trade"

INTRODUCTION

Standing for a generation, as THE CANNING TRADE has stood, the representative of the canned food industry and all that that implies; having begun its existence when the business of hermetically sealing or preserving foods was itself in its infancy, and having been intimately associated with every movement of that great industry in its rapid advancement; fighting its battles at a time when the industry was weakest; suggesting the advantages of and actually forming the first Association of Canners, and instrumental in the formation of every one since; known to all men in any way connected with the industry as the honest, fearless champion of the canned food industry, it is but natural that the requests for a reliable work, one that would be of practical use to all, in the factory itself, should come to THE CANNING TRADE.

These requests have come from every section and from men in every branch of the industry, covering every article handled by the packers. In the early years they were the natural outcome of the effort on the part of all in the industry to make a secret of the process, but for this reason it must not be supposed these requests came only from new parties wishing to go into the business. Men who had made a success packing certain articles wished to increase the number, and experience had taught them that a good beginning was half the battle won. These frequent requests compelled us to gather the desired information, and in seeking, naturally we chose the best obtainable. This was copied in a large book, and the frequent additions soon made the book practically complete. But not only were formulæ thus collected, but accounts of the varied experiences in different sections of the country with certain foods by the different packers, were kept in this record. And thus was compiled, little by little, an amount of information on the processing and preserving of foods, from the leading processors of the day, that without doubt had not its equal in the world. It afforded comparisons that were most instructive, one processor's method with another's, one way of treating a fruit or vegetable with another in vogue somewhere else, the effect a difference of seasons, whether wet or dry, had upon the time and results, all of which was from actual work in the process room and not from theory.

As may be supposed, it took years to accumulate this mass of valuable information, and our object may be seen in the book we herewith present.

"A Complete Course in Canning" is not a copy of the records of the book above referred to; it was written by a man who has had a vast experience in canning, preserving, pickling and in every branch of food preserving, not in one section, but in almost every section of this country and Canada. But his work was compared and checked against this book and made to correspond with it.

Realizing that an immense amount of good could be done by giving straightforward, practical instructions, such as could be readily understood by all and used in the process room actually, THE CANNING TRADE undertook the publication in serial form of this work. Its original intention was to start with each article in the selection of the seed, the preparation of the ground, the cultivation of the growing crops, the harvesting of the same and their removal to the factory. But so eager were our readers for the pith of the story—the actual working formulæ in the process room—that we had to forego the first part of this, and content ourselves with the contracting for the crops, their removal to the factory, and then take them step by step through the factory, until we had seen them safely and neatly labelled and boxed ready for shipment. This is what the packers wanted and this is what we gave them.

Our original intention was merely to treat canned foods in all their varieties, but in giving these we aroused a great desire for information upon the making of Jams and Jellies, Preserves. Catsups, Soups, Meats and Fish, and so these were added to the list and will be found in this volume.

The readers of this book will find the formulæ given are practical, ready for use; they have all been tried and used repeatedly by men who have made a success of the business, and there is but one reservation goes with them: CONSIDERABLE COMMON SENSE MUST BE ADDED TO ALL FORMULAE. By this we mean that it is absolutely impossible to give one set time of process for all conditions and locations: that every change of temperature, altitude, difference in soil or fertilizer, a wet or dry season, and a hundred and one other causes may have an effect upon the process, and so NO LARGE PACK OF GOODS SHOULD BE PUT UP UNTIL A TRIAL BATCH HAS FIRST BEEN MADE. And not only at the beginning of the season, but frequently during the pack, in order to detect any changes.

If used judiciously, in this manner, these formulæ will be found satisfactory, differing possibly with different processors, as is natural, but worthy the high approval set upon them when they were published in serial form.

THE CANNING TRADE.

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THE CANNING INDUSTRY

It is now just about one hundred years since the French Government made a practical effort to give to the world in general the results of its endeavors to find a better and more wholesome method of preserving foods in a manner as nearly fresh as possible; and it must be admitted by all that we owe the origin of the canned food business, as it is at present, to the wisdom of the French Government, and that the Government of the First Republic.

About the year 1795, that is to say right at the height of the reign of terror in France, the French Government offered a prize of 12,000 francs for the best method of preserving fruits, vegetables and other elementary articles without pickling or dessication. The French Minister of the Interior, M. Montalivet, acting on the report of the Board of Arts and Manufacturers, granted to M. Nicholas Appert the reward of 12,000 francs. This award was made in 1810. The according of the award required the recipient to furnish the Government with a true and faithful copy in book form of his methods in full, for the benefit of the world in general, and M. Appert complied with this requirement before obtaining the money.

Whilst this is a French invention and not an accidental discovery, the developments of it during the past century have tended to make it peculiarly an American industry and success. But it is true today that we have no men in our midst, nor in the best factories in the world, that we are aware of, who can do what Appert did with foods. One test of this matter is the preservation of eggs in a fresh condition. To keep eggs in hermetically sealed vessels, through the application of heat, is of so delicate a nature that it must be possible when eggs are taken out of the vessel to make an omelet of them, which proves that they are of their original nature. Even "limed" eggs will not do this. And yet Appert had the time and method by which it could be done.

M. Appert was excellently equipped in the experience of life to accomplish what he undertook, and there were probably fifty years of experience in his dealings with the various lines of foods with which it was necessary for him to be acquainted, before he made public his method. He was in turn a pickler, a preserver, a wine maker, and we believe a confectioner, during the long years of his application and work. During all this time he was very poor. Any money he got was expended in further experiments, and while he lived to be over 90 years of age, we believe he died in comparative poverty in spite of the award obtained from the French Government and his attention to work.

The French Chambers, however, after his death, recognized the vast utility of his invention to mankind in general and virtually placed his name among famous men by creating his son a Chevalier in the Legion of Honor in recognition of his services, and the family hold that honorable position to-day in France. The French Government also ordered a life-sized bust to be made of him, and we believe that has an honorable place in the office of the Minister of the Interior.

But the development of a century virtually changed the utensils and broadened the methods of Appert under the extension of demand which came through American business; and a view of his simple utensils and process room, so to call it, would provoke a smile to-day.

We believe it was in 1809 that an English tin-plate worker took out a patent in England for a vessel of tin plate for use in the preservation of hermetically sealed foods, and we mention the fact here in connection with the previous greater fact, because to-day the canning industry is as much dependent upon the can, and, in fact, has taken its commercial name "canning" from it, as the can-making industry is dependent upon the hermetically sealing business.

Under the title "A History of the Canning Industry by Its Most Prominent Men" "The Canning Trade" published in January, 1914, a splendid and comprehensive history of the origin and development of this business in all lines and in all sections. It should be read in connection with this brief reference.

One thing, however, we would like to emphasize here, and that is that the French carefulness in everything they do, especially in regard to foods, would add vastly to the excellence and reputation of American canned foods, if it were only generally practiced. This excellence, the results mainly of patience, operates from the selection of the seed, or even the growing of the seed, to the affixing of the brass label for high-class trade; and the Government at Paris recognizes not only the sanitary advantages of this method but the commercial advantages that result from it, and is so careful with regard to the honest efforts of the French canners that it appoints Boards of Inquiry to investigate charges against methods in the canneries before condemning them from mere newspaper accusation. Thus in the matter of green peas, which is probably one of the largest of the French lines of canned foods, the investigating boards reported that a small amount of salts of copper was highly beneficial in a commercial sense and not injurious to the consumer; and under the French law packers are allowed to use a certain slight proportion of sulphate of copper upon green peas. It is this permission, not abused by the French packers, which gives to French peas the admitted superiority and pre-eminence they have throughout the world, and tends largely to continue the great demand for French peas. Colored peas cannot now be imported, the United States Pure Food Law prohibiting their entry.

The United States national law, however, sweepingly condemns all poisonous matters without respect to judgment, prevents the American packer from competing upon equal grounds with his French rival and virtually prohibits the expansion of the American green pea packing business beyond our own limits. But we doubt very much if American canned food packers could be allowed to use salts of copper in greening peas, even if the law were made precisely the same as the French law. For the average American is either too independent, or, perhaps, too ignorant to allow himself to be tied up by any mere law. So our Pure Food advocates are almost compelled to drastic action in this matter, and the elimination of all coloring matter.

A MARKET.

As the particular object of this work is to keep to the essentially practical questions and the solution of them, without any regard to whether the reasoning herein shall be satisfactory to promoter, packer or distributor, we will first take a glance at what is probably the most important question the packer has to consider, that is where and how he will market his goods after he has put them up.

Now, the sale of canned foods, like everything else pertaining to the necessities of the human family, will depend upon the contiguity of the market; or, in other words, population. It might be necessary to stop here and consider the question of transportation costs of these goods; but it is very evident that the facilities of transportation in these modern days are, in America at any rate, in exact proportion to the extent of population. In other words, financial and stock matters always result in placing the means of transportation where there is population to justify the expense. The canning industry has therefore to thank the other lines of commerce and manufacture for this simplification of a great difficulty; but, in turn, this matter of established communication and transportation really governs the location of canning factories. There are, however, some peculiarities, geographical as well as commercial, in which the center of greatest population may be considered the governing factor. Thus the 39th degree of latitude is the median line of the westward progress of population in America, as demonstrated by recurring census for more than a century. Now this 39th degree of latitude runs about on a line of Baltimore, Indianapolis, Denver and somewhat north of Sacramento; in other words, through Maryland, Ohio, Indiana, Illinois, North Missouri, the dividing line of Kansas and Nebraska, Northern Colorado, Utah, Nevada and Northern California. We mention these States in the order in which they lie from East to West, because the increase of population, or what is known as the center of greatest population, has moved westward contiguous to this line at the rate of an average of 40 miles each ten years; and in the last census (1910) was to be found about 4 miles southeast of the town of Unionville, Monroe county, Ind., which is about

thirty miles south of Indianapolis. It is advancing, therefore, directly into the State of Illinois at present, and in about twenty years will be found north of St. Louis. Along this isothermic line this increase of population may be relied upon to continue, and the importance of this knowledge will be appreciated in respect to the canning industry, when it is understood that this is the identical line of what may be known as the center of the tomato packing region. The market for canned tomatoes essentially lies with the greatest population. Railroad transportation will always follow the same course. Therefore, the two important facts of distribution and consumption are to be found along this line of the 39th parallel.

TOMATOES.

Tomatoes are not, and never will be, a heavy northern pack, because the season is too short to make them plentiful in production, and there is always danger of an abnormally early frost to destroy the vines in the middle of the season.

This marked condition would not prevail were it not that by keeping south of this line of the 39th degree, the reverse condition may be relied upon, and, therefore, it will not pay anyone to undertake to compete in northern latitude with tomato growers in a more congenial clime. It, therefore, follows that the man who wishes to be successful in packing tomatoes should consider these facts, but at the same time not overlook the corresponding important fact that to go below this line a great deal will take him into a section too far removed from population, too poorly equipped with transportation facilities and, therefore, lacking the two first essentials in marketing his goods. This will show distinctly that a little consideration at least is necessary both to the would-be packer and the promoter in their intended operations; and a man must consider well and decide definitely as to whether he is going to make tomatoes the basis of his business to rely upon, or other staples.

CORN.

By, in what may be considered, a strange and fortunate coincidence corn appears to occupy an entirely different position in this geographical situation to what the tomato crop does. While corn can be grown successfully in the fields from the parallel of 35 degrees to that of 45 degrees, it does better and produces a sweeter article in the northern section than it does in the warmer climate. Sugar corn appears under all circumstances to develop a finer quality of the article in the higher latitudes, and this is probably due to the influence of sudden growth and development from a short and hastened summer. Even in Maryland corn grown on the slopes of the western mountains and at the foot hills of the Blue Ridge is, in so far as sugar corn is concerned, a sweeter and better article than that grown in the low lands near the sea. It is from this fact also that Maine

has gotten its reputation for the quality of its sugar corn. Northern New York shares this excellent reputation; Illinois and Wisconsin are turning out very fine qualities of this article, increasing each year, and in the order of progression with time, we may expect to see Bismarck, Helena and Portland, Oregon, or Olympia, Washington, vieing with Portland, Maine, in the quality of their canned sugar corn, although the Pacific cities last named and that location may suffer somewhat in quality from the moist effects of the Japan current.

The same remarks we made in respect to the location of tomato factories in the middle section will apply to the consideration of locating sugar corn factories in the northern sections. The median line which we first mentioned will at all times have the preference in the minds of practical men, because the three great requisites of the business come together there naturally, that is crops, population and transportation facilities. But it means more than this when further considered. Because of the facts we have recited it is reasonably certain that competition of prices will be more keen along this line of tomato factories, always more numerous than those of corn factories, and we would be willing to risk the assertion that fluctuations and speculations in canned tomatoes will always exceed that which will develop in corn. It is certain to be, and that which is certain is worth consideration.

PEAS.

The third one of the great staples of the canned food industry, considering the vegetable essentially, is the green pea. The packing of this food has assumed very large proportions. In respect to this article the animus of the industry appears peculiar. When a new firm starts in an agricultural section to put up canned foods, the height of its ambition is generally bounded by a desire to pack tomatoes or corn, according to the latitude it is in; but it seems to be the fact that every canned food packer after learning how to pack corn, gets the pea packing hornet in his bonnet, and will not be content till he packs peas. Nothing but the difficulty and the excessive care in packing good green peas has prevented the packing of this excellent article from having been greatly overdone. We have witnessed within fifteen years such a development of the packing of green peas that it looked as if the market would be swamped with the amount; but that conservation of forces which seems to take care of all things in this world managed to prevent its being overdone. In the first place, because the packers did not give the right care to their work, not knowing what was necessary to be done to make good peas, a large quantity of the pack in some sections was sacrificed at such cheap rates that it considerably curtailed the pack of the following year. Then again the famous pea fly came around and the crop was blasted. For many years the packing of green

peas was restricted to certain places on the Atlantic coast, especially Baltimore and its neighborhood, and to a small degree central New York State, but the advent of the Chisholm pea beater permitted the packing of green peas at almost any section where tomatoes could be packed, and the later addition of the pea viners and separators made a large number of hands unnecessary in this special work. Green peas can be grown well and packed anywhere from the thirty-fifth to the forty-fifth degree of latitudes, but the location and character of the country wherein they are grown have very much to do with the quality of the peas. Recent experience has taught that if green peas are not planted in cold weather and before the warm spring changes commence, that the pea fly may develop beyond management, and further that what the peas need most in a growing condition is a moist, mild climate. It is for this reason that the growing and packing of green peas developed so largely in the Chesapeake region, and primarily around Baltimore because the need of many hands in both the field and canning factories required contiguity to a large city to get such a supply of labor in the days before they had machinery to do this work. Peas can be grown well and economically in the interior, even in a dry section, but the quality of the pea itself, the integral composition of the green pea varies with the soil and climate with which it is raised. In a dry climate, especially, where there is alkali water in the streams, where there is much lime in the soil, the peas will absorb too much lime, and though they seem to be young and tender will swell more in processing, but not turn out so tender as those that come from a more moist climate and softer water. It is probable, therefore, that the fixed locations of great pea canning establishments will be the humid coasts of the oceans, both east and west, and upon the interior lands contiguous to the great lakes, and, perhaps, in the future in the sections where the United States Government may prosecute irrigation for a national benefit.

This is a matter which should be considered by every one proposing to make pea packing a considerable part of the business; the packing of peas, it will be found when we come to consider that special article, requires more care than any other article in the vegetable list, and as our green peas have a competitor in the European article of French green peas of the very finest quality, it is essential that only the very best effort be directed to the production of this article.

In a general sense the canned food industry may be divided into classes or species, viz.: Fish, Fruits, Meats, Milk, Sauces, Soups and Vegetables.

Vegetables as used in this arrangement differentiate from fruits, which also belong to the vegetable kingdom. We have mentioned and discussed above the general question of the vegetable section, and we propose now to glance in the same way at what are known as the fruit sections of the United States and North America.

FRUITS—APPLES.

Considering fruit in the important matters of quantity and public favor, we think it safe to say that apples hold the prime position. The apple to all other fruits appears to be as the rose to all other flowers, the most universally known and the general favorite. In the canning industry the assertion can be made that the extent of the apple crop in any season fixes the value of all other fruit crops, and in this respect it is of great importance to all fruit canners to watch closely the conditions of the apple crop and the quotations of apples throughout the season. Two things are steadily developing in the American apple business, one is the increased annual call made upon this country by Europe for our apples, and the other is the steadily increasing demand for apples in gallon or as they must now be called "No. 10" cans, for what are known as commercial purposes. These commercial purposes are mainly foreign shipment of this fruit in tin, the use of canned apples in the pie-making establishment, and in hotels and dining-rooms. The canning of apples has become almost a specialty in the industry, and, therefore, a location in what is known as an apple section would naturally cause a canning factory so located to regard apple canning as a possibility to an increase of their business or line. Such a factory, however, should be located as near as possible to the consuming market, that is, either towards the greater centre of population, or the foreign exporting ports.

The principal apple sections of North America at present are: New York State, Ohio, the Missouri Valley, Pennsylvania, North Pacific Coast up towards Vancouver sound, and then the Tennessee, Virginia, and the upper Mississippi Valley sections of the country; their importance being relatively about in the order given.

Canada is an important apple growng section of North America, and England is an interested market for most of the surplus apples of the Dominion.

There are two classes of apples used by the canners. The summer apple which is usually too watery to keep when barreled, and, therefore, when the crop is large can be bought very low for canning purposes, and, of course, will keep indefinitely when tightly sealed; and the winter apple, coming in very many varieties and growers are steadily developing new ones.

PEACHES.

Next to apples, we presume peaches hold the position of quantity and favor among canned fruits. The great peach growing sections of the United States are much more limited than are the apples. The season is shorter, for peaches must be secured while in their best condition, or they will spoil. There was a time when peaches were common every summer along the Atlantic coast as far as Maine; but the orchards appear to be dying out more and more certainly

with the passage of time, disappearing from the northern sections and developing more or less in the South. It is within the memory of the living when New Jersey had many fine peach orchards; today it may be stated that it is not possible to successfully cultivate peaches in New Jersey, and the same deterioration and depletion is rapidly proceeding in the Maryland and Delaware Peninsula, which twenty-five years ago was considered the very paradise of the peach.

The great peach section of the Atlantic upon which the eastern locality has to depend is Georgia. In the interior of the country in the eastern half of the Mississippi Valley, peaches do not appear to be a crop that can be depended upon, as they only have a full crop about once in six or seven years on account of the uncertainty of the climate. Ohio and Kentucky should have great peach orchards, but when the wintry blizzards blow unobstructed from the great prairie lands of the Northwest, they bring such low temperatures with them that the peach crop is more often a failure than a success, and as these trees are sub-tropical in their nature, the tree itself suffers from these untimely visitations.

Michigan, however, although more northern, is more fortunate in this respect, because it is comfortably cuddled in the embraces of the Great Lakes, and gets protection from the ameliorating influences of the very waters which surround her. Michigan, therefore, is a prosperous northern peach region, and this peculiar influence of the Great Lakes affects the contiguous lands easterly along the borders of the Great Lakes, so that New York State for a few miles within the southern margin of the lakes is quite an important fruit growing section. The Missouri Valley, especially in Kansas and Arkansas, is also considerably a peach growing section, but a large quantity of the peaches native there are of the Spanish variety, which do not find the same favor as their lighter brethren. When, however, we get down into Texas we reach another section where the peach is at its best, and the eastern portion of Texas is becoming more and more a great peach growing section, and when population increases sufficiently in the southwest region and transportation facilities are increased, Texas will compete with California in this and other fruit growing. But of all sections of the United States, California is the paradise of fruit and of peaches especially.

The peach and its cousin, the apricot, grow in immense quantities with almost perennial conditions in the golden State of California. For many years the East has almost depended upon California for a large portion of its canned fruit, the dependence being mutual. The extraordinary difference of value upon which freight has to be paid by rail has to a large extent precluded the shipment of any but high priced, and, therefore, the finest quality used in tin. So that peach packing has divided itself into two classes: High price, fine quality of fruit from California, and low priced, ordinary or common quality from the Atlantic coast. Therefore, it can be reckoned that a man who proposes to can fruit in California, must de-

vote himself for a while, at least, to only high grade goods and not try to compete with the standard, seconds and pies of the Eastern section, as railway tariffs will keep him out of the populous market.

The opening of the Panama Canal may change this condition materially, and permit California to supply immense amounts of "pie" peaches to the Eastern market: a consideration of doubtful benefit to California.

SMALL FRUITS.

Pears and plums furnish a considerable item in the annual pack of fruits, but they are only minor factors in the fruit line, though the demand is increasing. It is strange to say that common pears are becoming so plentiful throughout the United States that there is no money in packing them, but Bartlett pears are never in sufficient supply, and are always an article worthy of consideration, and may be depended upon to pay well if canned as a fine, high-class product.

Small fruits of all kinds hold a peculiar position in the canning industry. Twenty-five years ago there used to be a great public demand for them every year as canned fruit, but there came a wave of lack of appreciation over the people and demand for them almost died out.

California still furnishes the world with a considerable quantity of the better class, and strawberries and raspberries in heavy syrup as high class goods are more in request of the better people and the hotels.

What is true of these goods is also true of cherries, and the decadence in the packing of cherries has been due more to the result of rain on the crop in season, and the consequent loss of dependence upon this fruit in season. In any section where cherries can be depended upon as an annual crop, it will pay to can them in good styles, and there is even a steady sort of market among pie makers for the cheaper qualities.

SUNDRIES.

There is one article which we scarcely know how to catalogue in the list of fruits and vegetables, for while it is certainly a vegetable, it is used almost exclusively as a fruit by those who purchase it in tin. We mean pumpkin and squash. It may be classed entirely almost as a Northern article, its habitat is in the Northern belt, and naturally the demand for it is in the same section, but the article itself keeps so well in its natural state, almost entirely through the winter, that the energetic housekeeper seems to prefer crooknecks to the canned article. All the country eats pumpkin pies, and for such purposes there is a considerable pack put up each year. The preparation of it in the canning by means of machinery makes such a fine custard pumpkin of it, that housekeepers prefer it in many cases to a hard and crusty pumpkin.

In the South the sweet potato does duty in nearly the same way as pumpkin in the North, and there are hotels and public providers throughout the land, which must at times be able to supply sweet potatoes at any time of the year.

We think this general review of the section and crops of fruits and vegetables will enable almost any one desiring or proposing to go into the canning business to inform himself reasonably as to the prospects of any location for a canning factory, and the line of goods the he could most profitably handle in the selected section, and to accomplish this is our purpose in these statements.

In establishing a cannery it is, of course, presumed in the first instance that the parties contemplating the erection of a factory have duly considered the possibility and probability of growing, or being able to purchase at equitable prices, sufficient products of the varieties it is desired to pack in the immediate vicinity of the place, sufficiently large quantities to run the factory at its full capacity for a reasonable period of time.

POSSIBILITY OF ACREAGE.

In considering this question of the supply of raw stock for canning, it is not sufficient to be merely assured that the land in the section in question will produce the particular vegetable or fruit; but it should be conclusively proven that the crops so produced are well adapted to canning—that is, that the texture of the fruit or vegetable will stand the process of canning and turn out well. Much trouble has been experienced by old packers through the fact that growers brought in the one vegetable, grown in widely separated sections. though all within a small radius of the factory, and raised according to the individual grower's ideas, but which were found when "processed" to turn out greatly different in quality. One section of the country may grow a vegetable that may be very fine in appearance. but which may be too watery, too soft, or too fibrous and consequently too tough and so on.

The best is not too good for canning, and this should be borne in mind, if success is to be expected.

If this point be satisfactorily passed, the next consideration to look to is a sufficiency of supply. As the packer is necessarily restricted in the prices he can pay for his crops, he should be careful to see that there are enough growers willing to undertake the growing of the crops in question to such an extent that the factory will be kept steadily employed during the season. Plain, open dealing with the grower will be found the best policy in this case. stating just what he may expect from his crop. If the grower is led to believe his fortune will be made in the first year out of any crop, by painting the picture too glowingly to him, he will look for it, and not finding it, is liable to give trouble another year. The profits of any crop going to a canning factory are small, but compare favorably

with any of his other crops in the average year. Having dealt honestly with him, insist upon a strict return of the same character from him.

SEED REQUIRED TO PLANT AN ACRE.

Kind of Seed.	Quantity.
Asparagus in 12-inch drills	10 quarts
Asparagus Plants, 4 by 1½ feet	8,000
Barley	2½ bushels
Beans, bush, in drills 2½ feet	1½ bushels
Beans, pole, Lima, 4 by 4 feet	20 quarts
Beans, Carolina, prolific, etc., 4 by 3 feet	10 quarts
Beets and mangold, drills, 2½ feet	9 pounds
Cabbage, outside, for transplanting	12 ounces
Cabbage, sown in frames	4 ounces
Carrot, in drills, 2½ feet	4 pounds
Celery, seed	8 ounces
Celery, plant, 4 by ½ foot	25,000
Clover, white Dutch	13 pounds
Clover, Lucerne	10 pounds
Clover, Alsike	6 pounds
Clover, large red with timothy	12 pounds
Clover, large red without timothy	16 pounds
Corn, sugar	10 quarts
Corn, field	8 quarts
Corn, salad, drill 10 inches	25 pounds
Cucumber, in hills	3 quarts
Flax, broadcast	20 quarts
Grass, timothy with clover	6 quarts
Grass, timothy without clover	10 quarts
Grass, orchard	25 quarts
Grass, red top or heads	20 quarts
Grass, blue	28 quarts
Grass, rye	20 quarts
Lettuce in rows, 2½ feet	3 pounds
Lawn grass	35 pounds
Melons, water, in hills 8 by 8 feet	3 pounds
Melons, citrons, 4 by 4 feet	2 pounds
Oats	2 bushels
Onions, in beds for sets	50 pounds
Onions, in rows for large bulbs	7 pounds
Parsnip, in drills, 2½ feet	5 pounds
Pepper, plants, 2½ by 1 foot	17,500
Pumpkin, in hills 8 by 8 feet	2 quarts
Parsley, in drills 2 feet	4 pounds
Peas, in drills, short varieties	2 bushels
Peas, in drills, tall varieties	1 to 1½ bushels
Peas, broadcast	3 bushels
Potatoes	8 bushels
Radish, in drills 2 feet	10 pounds

WATER SUPPLY.

The next important item to be considered is a bountiful supply of the purest and coldest water obtainable, which should be introduced into the building through large pipes, tapped at several places convenient to the work. The main pipe or pipes should be large enough and pressure great enough to permit the water to be drawn simultaneously at several different points without materially lessening the flow at any one. Water containing iron or sulphur compounds should not be used in syruping or brining, but may be used for all other operations of the plant. This also applies to a brakish water, especially, that containing any percentage of iodine or bromine. As but a small proportion of the total amount of water consumed is used in syrups or brines, if pure water cannot be procured from other wells or different sources, sufficient may be secured for these purposes by distillation. This process must be conducted by a special apparatus properly handled; not by collecting the condensed steam from the boilers in iron pipes, as water so obtained is apt to be contaminated to a certain extent, particularly if boiler "compounds" are used to prevent scale.

CAPITAL REQUIRED.

Following the selection of a suitable locality the paramount consideration is the providing of ample capital, to properly install the plant and meet all ordinary operating expenses, with command of such credit as will enable the borrowing of sufficient money on favorable terms for the extraordinary expenses of the packing season, and, if necessary, for the storing and carrying over of stocks until they can be disposed of at a reasonable margin of profit above the cost. For the benefit of all concerned in this great industry, the parties directly interested, the trade in general and the consumers. thus including everyone of a vast population, the evil effects attending the establishment of packing houses with insufficient capital and poor credit, cannot be too strongly condemned. Sooner or later it almost inevitably results in failure of the concern through marketing of goods at less than the cost, or the depositing of them as collateral in warehouses at ruinous rates of interest and charges, to secure funds to meet pressing obligations. In either case this means loss on the business done and in deterioration of the plant. Facing such conditions it is not human nature to expend any more money on improvements, and to make just as few repairs as possible. It is a self-evident fact that in these days of intense competition, in order to be successful it is absolutely necessary to keep the factory and its equipment in the highest state of efficiency and to meet all financial obligations promptly.

The amount of capital required to properly conduct the business varies quite as much as the difference in various establishments.

but it may be broadly stated that experience has shown that factories of a daily capacity of 15,000 cans or over, working on either corn or tomatoes, should be capitalized at as many thousand dollars as the daily capacity of the factory is in thousand cans of finished goods. For example, a tomato canning plant with an output of 20,000 cans daily should have a capital of $20,000. Estimating that the complete plant cost $12,000 to equip, thus leaving $8,000 for working capital, the season will average about five weeks, putting up a total of 25,000 cases, at a cost of say 70 cents per dozen, or a total cost of $35,000. Therefore, such a concern should be in shape to command $10,000 to $20,000 in addition to their capital stock, either as ready money or credit. A concern working on a larger variety of crops for five or six months in the year, figuring on the same basis of 20,000 cans daily capacity, would require a capital of $30,000; and, if extended to a winter pack, practically covering the entire year, would require not less than $40,000 as capital.

LABOR.

It is important to be sure that all the resident labor necessary to conduct the more important and responsible operations of the factory be at hand and that sufficient floating labor can be obtained for the rougher work and during the times of extraordinary rush. For a factory packing a comprehensive general line the supply of cheap, floating labor will determine, to a great extent, the nature and character of the labor saving machinery necessary to install, but until every operation of the canning factory can be done automatically, careful attention must be given this labor question. To packers old in the business the question of automatic machinery, or machines in the place of "hands," has been answered in favor of the machine. While the bulk of the work done around a cannery is not such as to require "skilled" labor, the help should be such as may be depended upon. Nearly all factories have to import help during the rush seasons, but for this very reason it is very difficult to secure good help when wanted.

The importance of this consideration cannot be overestimated, because the loss of raw material from inability to handle it, on account of lack of help, in a few days may eat up the profits of the entire pack. Every year we hear of many factories having to allow large lots of the green fruit go to waste and be thrown away, after having been received from the growers, on this account. Or, if an attempt is made to "work up" the surplus, it will be necessary to do night work, and while this can always be counted on as a certainty during the busy season, it becomes a source of much trouble to the superintendent if it is too frequent. For the help, after working from six o'clock in the morning, do not care to work after six in the evening, and while the extra wages earned by working "overtime" a couple days in the week will be sufficient to induce them to

do so; if more time than this is attempted, they will either slight the work of the next day, or stay away from the factory altogether. Either case makes trouble that it is well to try to provide against.

Here, too, the superintendent should exercise good judgment in handling the help, so as to get the best work out of them, without constantly worrying them or seeming to "nag" after them at all times. This, however, will be taken up in its proper place, together with the best means of keeping time, etc., the object here being merely to impress upon all packers the necessity of providing as much before hand as possible, for a plentiful supply of good help.

TRANSPORTATION FACILITIES.

In deciding on the location of a factory the question of satisfactory facilities for transporting the finished goods and obtaining supplies at such freight rates as will put the factory on an equal basis with competitors in the same line must be fully considered. Even if there may be some advantage in buying the raw materials a trifle cheaper, this will not counterbalance excessive freight rates, or a long haul with animals as motive power. In respect to transportation facilities the ideal situation is on a body of navigable water with siding from the main line of the railroad to either side of the factory.

FACTORY SITE.

The site of the plant, if at all possible, should be on high ground, having good natural drainage. Stagnant water, under or around the building, especially if contaminated with refuse and waste which is always a possibility about any canning factory may form a breeding place for various microbes which will do incalculable injury to the pack.

To prevent water and waste lodging under the factory both the peeling and packing departments, if not the whole building, should be provided with water-tight floors sloped to gutters, emptying into drains which convey it away from the building.

PROPER FLOOR CONSTRUCTION.

For a working floor in the factory proper nothing has been found for its cost equal to that of Portland cement construction. If properly finished as to surface it is practically impervious and may be easily cleaned with a hose. It is sufficiently hard to enable the setting of ordinary machines directly on it, and it resists wear due to walking upon it indefinitely. Careful attention should be given to the grading of the surface of the finished floor where much water is used. The grade should be not less than one-eighth of an inch to the foot, and one-quarter is better. The length of grade in any direction should not be more than sixteen feet. Where it is necessary that some water should run over the floor where persons are working, an excellent plan is to form in the surface of the floor half-

round grooves one inch wide, four inches center to center. These grooves carry off the greater part of the water, thus giving a reasonably dry working surface.

Should it be necessary to use wheeled trucks continually over any part of the floor, no joints whatever must be made in the surface. The slight jar of iron wheels passing over joints will soon pound out the concrete, resulting in a hollow which must be patched. Naturally, the concrete worker will insist that the floor will crack if no joints are made. In this he is right, but the cracks will be so small that trucking will not generally affect them.

MACHINERY.

Where machinery can be used in the operation in the place of hand work it should by all means be done. We are not unmindful of the claims of quality on some articles on this account, but it is a fact the machine is cleaner than hand work, and that is the point. However, speaking generally, the canned food packers' must learn how to better treat and use machinery; in no line of manufacture in the country is machinery as much abused or misused, and it is generally due to the fact that the machinery is not understood. The more mechanical a factory is the better it is; and it is because of this condition in some lines of packing that those lines can boast over the less fortunate, and which really make them an exception to the general line of canned products. There are a number of tried machines that should be in every factory, large or small, and which would save the operator expense and money.

DRESSING ROOMS.

Before going into this matter, let us try to answer all those objections that are arising in your mind. We know there are some facetious ones who will ask if they must not furnish Turkish baths and manicurists, lady hair dressers, maids, etc., but disregarding these, there are others who will plead that the season for canning tomatoes and many of the other articles is too short to warrant expense of dressing rooms, and the profits of the business absolutely preclude them. For unless these ideas be put to rest, there is no use going on with what should be done along this line.

Will it pay you to have proper dressing rooms for both men and women employees, equipped with closet and toilet arrangements? We say yes; further that it will be the best investment you can make. Some of the best arranged factories in the country, as far as the help are concerned, are food factories, and the fact stands as their best advertisement. If you have a good sized, well ventilated room, one for the men and one for the women, but the latter particularly, wherein they can change their clothes, and keep their aprons, etc., equipped with one or more flush closets according to the number of hands employed; proper wash basins with a clean

supply of towels, you will find that you are not only doing what you absolutely should do in common decency, but that you will be able to raise the standard of the help in the factory. You will be able to get better help, and they will begin to take care of their appearance, to be neat in their persons and their work; and what is of the greatest value to the industry at the present time, you will turn that vast army of workers that now spreads out over the country reviling canned foods and the factories that produce them, into a host of living witnesses and cheerful testifiers to the wholesomeness and cleanliness of canned foods. You will make these workers brag of the goods, instead of damning them, as they do to a large measure.

You have plenty of water, see that you have wash troughs (sinks) for no other purpose than for washing the hands, and supplied with towels. There should be several of these at convenient points about the factory, as well as in the dressing rooms, and the hands should be MADE to use them. It ought not to be necessary to mention this, or to say that cleanliness demands it.

When you have these things then you can compel the workers to keep the tables and machines free of aprons, rags and such unsightly objects; with the walls nicely painted or whitewashed and the floors free of muck and slop, you will have a factory that you will be proud of, that the hands will boast of, that you will get more and better work from, and which will turn you out a better profit, fewer rejections and no more "kicks."

CLEANLINESS OF WORKERS.

Then the dress of the women must be looked after, and they must not be allowed to come to work in rags and filth. Keep in mind that they are working on food, that people have to eat what they handle, and think what a sight such a horde of workers would make to the public. See that their hands are free of running sores—for they very frequently have them—and that they wash before they commence work, and after using the toilet. Right here very serious thought can be expended with good results. Do not, under any circumstances, allow consumptives to work on foods. See that the "force" is a clean and healthy one.

Report of Committee on Sanitation

The following report of the Committee on Sanitation was adopted by the Baltimore (1914) convention in the shape of a recommendation, and the Secretary was instructed to have the same printed and distributed among the members of the National Canners' Association.

Your Committee on Sanitation beg to report: That they have carefully considered the question of factory sanitation; that the subject has been freely discussed at various meetings of the Executive Committee; that many excellent suggestions were received by it from practical canners identified with this Association, and that as a result of such efforts we submit the general and specific recommendations hereinafter following.

IT IS RECOMMENDED that in order to secure better and more uniform sanitary legislation, the conditions under which foods are produced be made the object of special state sanitary inspection and regulation and to further that end the several states be asked to give force to the specific recommendations hereinafter made, either directly by enacting such recommendations into law or delegating to certain officers or commissions authority to adopt them with like effect so that violations of the provisions adopted in either case be punished by a fine for the first offense and that continued offenses be punished by imprisonment.

LOCATION AND GROUNDS.

Factories preparing food products shall be located so as to be able to receive and distribute their products promptly without danger of damage or deterioration and shall not be located in the immediate vicinity of any other industry which may be objectionable because of noxious odors given off or because of the use of decomposed products.

No food factory shall be located in an insanitary place or one which cannot be made sanitary or maintained in a sanitary condition.

No food factory shall be located where the refuse from the plant cannot be disposed of in a sanitary manner, and not of itself become a nuisance to the factory.

No litter, waste, refuse, or decomposed products shall be allowed to accumulate in or around the buildings or yards. All liquid waste shall be conducted from the building by means of suitable drains. Gross by-products suitable for other usage, as pea vines or corn husks, may be stacked or placed in silos separate from the building and must be surrounded by a tight drain to intercept any oozing liquid. Other by-products may be retained only if rendered unobjectionable. Raw tomato skins, cores, etc., shall not be permitted to be piled near the factory, nor to be distributed on the land within 500 yards of the factory.

BUILDINGS.

All buildings used for the manufacture of food products shall be clean, properly lighted and ventilated. The ceilings shall be of sufficient height to permit ample clearance for all work under any suspended shafting, hangers, piping, galleries, etc. Where natural light and ventilation are insufficient provision must be made for augmenting the same by mechanical methods. The interiors of all working rooms shall be kept a light color by paint, whitewash or other suitable method.

The floors should preferably be tight and pitched to accommodate the machinery—that is, to confine overflow and waste to the smallest area. Gutters should be provided to carry all waste to the sewers. Grating should be provided around cookers, washers, and at other places where overflow is unavoidable. In case a slatted floor is used over a cement or other tight sub-floor, a space of not less than four feet shall intervene in order to permit proper washing with hose. Slat or open floors shall not be permitted in factories over water, unless the movement of the stream or tidewater is sufficient to carry off all waste and not permit the same to become putrid or unless the slat or upper floor is removable for cleaning.

That the approval of proper officials charged with the enforcement of sanitary laws be secured before the opening for operation of any new food producing establishment, or when any building not now so used has been converted into such establishment.

MACHINERY AND EQUIPMENT.

Machinery and other equipment shall be of a sanitary type and of such material as to admit of cleaning. The tables should be plain and without sharp angles. All tanks of water in which a product is held, as tomatoes before scalding, and peaches and pears before filling into cans, shall be provided with a continuous fresh supply and an overflow.

Tomatoes or other products shall not be permitted to go to a scalder without first being washed, and no scalder or blancher shall be used continuously that is not equipped to maintain a continuous supply of clean water in the bath. No cans shall be brined or syruped by passing through a tank to receive the brine, syrup, or water by submergence—"dip tank." No syrup or brine, the overflow, from a syruping machine shall be used without filtering and heating to the boiling point.

All machines and conveyors shall be provided with automatic or self cleaners as far as practical. All tables, pails, pans, trays, machines, etc., shall be cleaned with steam and water at the close of each day and as much oftener as is necessary to prevent souring or unsanitary conditions. There shall be ample water and steam supply to keep the factory clean.

WATER SUPPLY.

There shall be an abundant supply of water of pressure sufficient for all cleaning purposes.

Only potable water shall be used in making syrups or brine, or in washing equipment coming in contact with food.

STEAM.

The steam capacity should be ample for all cleaning purposes.

Water and steam pipes with hose attachments shall be placed conveniently about the buildings so that floors, tables, machinery and equipment can be easily reached for cleaning.

PROTECTION AND SAFETY.

All power driven machinery, including all kinds of machinery necessary in the canning business, and all projecting and moving parts thereof, together with all the gears, belting, shafts, electric wire, transmissions, dynamos and all appliances, shall be so located as to be least dangerous to employees and shall be properly enclosed and protected. All dangerous parts in or about food and canning factories near which any employee is obliged to pass or be employed shall be properly guarded and no machines known to be dangerous or defective shall be used and no repairs shall be made on or to any machinery or the mechanism in connection therewith when the machinery is in motion. Effective means shall be provided for immediately disconnecting all power so that in case of need or accident any particular machine or line of machinery can be promptly and effectively shut down.

All factories shall be provided with sufficient and convenient exits or fire escapes.

TOILET ROOMS.

Toilet rooms must be maintained and where different sexes are employed they must be separate for each sex, plainly and distinctly marked, and to be used only by the sex designated.

Toilet rooms, including the walls, floors, ceilings and all fixtures must be kept clean and provided with sanitary paper.

Toilet rooms must open to outside light and air and be of sufficient size and equipment for the number of people employed.

Where toilet rooms are in the factory, they must be supplied with proper flushing appliance and connected with a sewer.

Outside closets must be sufficiently removed from the factory to avoid being a nuisance and built tight above the ground. The doors constructed to remain closed and the building properly ventilated, lighted and screened. The vault to be kept thoroughly disinfected and cleaned when filled to a level with the ground.

COMFORTS.

Sanitary drinking fountains shall be conveniently placed for employees and common drinking cups prohibited.

Stools or chairs shall be provided for employees at all work which permits of sitting.

Where a change of clothes for work is necessary, dressing rooms must be provided and hangers and lockers provided for street clothes.

A rest room furnished with chairs and couch must be provided in all factories where females are employed.

Cuspidors containing disinfectants must be placed conveniently.

Where living quarters are provided for employees they must be suitable for the purpose, frequently disinfected, properly ventilated and have sufficient light and air to be healthful and comfortable and be kept clean by the occupants.

No person afflicted with infectious or contagious disease or infected wounds shall be employed in a factory preparing or canning food.

Wash rooms must be provided conveniently located and of sufficient size and equipment for the accommodation of all employees and separated for sexes, equipped with running water and provided with individual or sanitary towels and plenty of soap.

RULES FOR ORDER, CLEANLINESS AND DECENCY.

Employees are prohibited from using tobacco and from spitting on the floors.

No foul, obscene or abusive language will be permitted.

Employees must be properly clothed for the work to be done and must conduct themselves properly at all times.

Employees shall bathe regularly and keep the finger nails clean and short, and wash their hands before commencing a piece of work that requires the handling of food.

A MODEL HAND-PACKING PLANT

The floor plan of the factory herewith presented has a daily capacity of 5,000 cans and upwards, and is intended exclusively for hand packing. The main building is two stories, 50 ft.x40 ft., with a one-story building at end 30 ft.x40 ft., to be used as the peeling-room, and which may be inclosed, if used in winter, or left open if used only in summer packing; also a structure on one side, 20 ft.x20 ft., to contain the boiler, process kettles, exhaust tank and cooling tank, and dressing rooms adjoining.

The second story of the main building is used for can and general storage, with shoots leading directly to the packing tables and tomato filler, if a filler is used. The entire 20 feet of the opening to the boiler-house should be left clear, excepting for a middle post, which may also be utilized for the upright of the crane.

Owing to the absence of shafting and machinery, the scheme for arranging the furniture and fixtures is quite simple, but the following details are suggested:

Presuming that the end of peeling shed faces east, with boiler-room on south, place the peeling tables (see description) lengthwise in southeast corner of shed 3 feet apart; the packing table (see description) cross wise 3 feet from peeling tables, and the capping table in the same manner 3 feet from packing table. Place the firepots on a properly suspended shelf 6 feet 6 inches above the floor and immediately over the table. At the end of capping table nearest the process kettles and within swing of crane, place a low table or bench of sufficient size and height for tipping cans in the exhaust crates. When running goods through the exhaust box, fill in process crates at this point. Place the exhaust box at other end of the capping table, the scalder opposite the peeling tables, and the blanching tank near the packing table.

Elevate the brine tank 8 feet above the floor, and place in such a position that it may be filled through an opening from the second floor. Lead pipes from this directly to the packing table. Locate the process kettles, exhaust tank and cooling tank in the extreme east of the room.

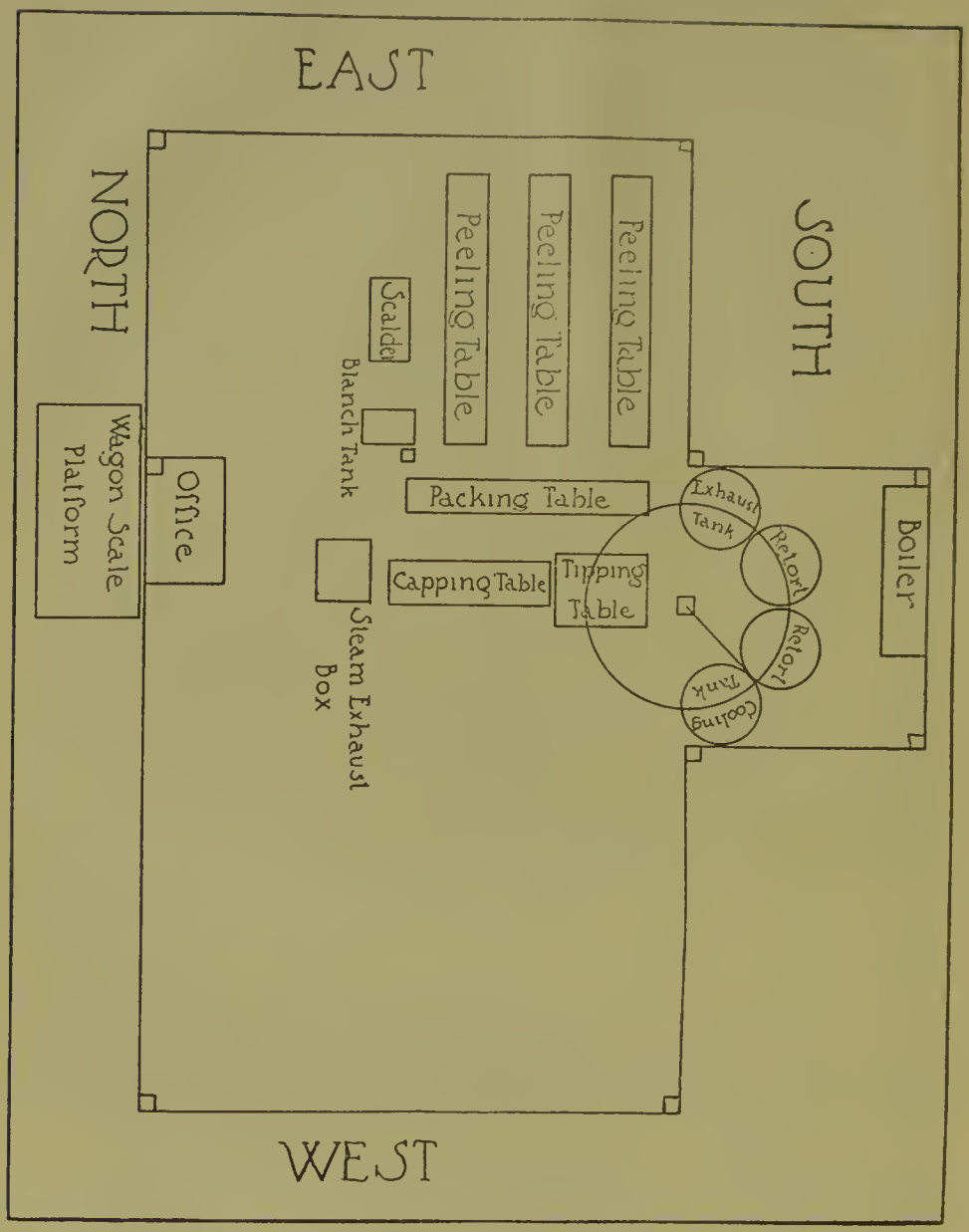
For packing a comprehensive line, including baked beans, an outfit similar to the following will be required:

One 4-ton Wagon Scale.

One 30-Horsepower Boiler, complete, with all trimmings.

14-inch Steam Pump, 2 30-brl. Water Tanks.

One 160-gal. Jacketed Copper Kettle, two Closed-Top Process Kettles, 40 in.x72 in.



Design of Model Hand-Packing Plant.

One Square Steam Exhaust Box.

One Iron Exhaust Kettle, 40 in.x24 in.

One Hand Crane, or one Hand Hoist on track.

One Cooling Tank, one Brine Tank (wood), one Blanching Tank.

One Gasoline Outfit, including 4 firepots and outside Gasoline Tank.*

Eight Capping Steels or Tillery Tools, four Tipping Coppers.*

Twelve Process Crates (3-tier), three Exhaust Crates (1-tier).

Two Single Dump Scalders (see Proper Tomato Scalders).

One Set Small Platform Scales, 12 10-lb. Counter Scales.

Three Peeling Tables (see Peeling Tables).

One Packing Table, 3 ft.x18 ft., 2-inch depression; 2-inch end pitch; zinc-lined.

One Capping Table, 3 ft.x 12 ft.; 60 Can Trays.*

Two Floor Trucks, fitting Steam Exhaust Box; two Crate Trucks, 2,000 Peeling Checks, eight dozen Peeling Knives, eight dozen 14-qt. Buckets, one dozen Scrub Brushes, six Acid Brushes* one Combination Vise, one Forging Stake,* one Forging Hammer,* two Files for Drawing Coppers,* two Fire Extinguishers, or Six Fire Buckets.

Also a moderate stock of sundries, including Apple Paring Machines, Cherry Seeders, Blanching Baskets, Peach Pitting Spoons, Oak Barrels for soaking and washing, Tin or Copper Measures, Tin or Copper Cup Measures, Slop Sticks, Nest of Sieves, assorted meshes; Valve Packing, Valve Disks, Can Openers, Can Testing Thermometers, Can Funnels, Chemical or Bath Thermometers, Hydrometer for Syrup, Rubber Hose, Solder Hemmed Caps,* Drop or Segment Solder,* Wire or Bar Solder,* Flux,* Gasoline,* Salt, Sugar, Catsup, Flour, Red and Black Pepper, Vinegar, Molasses, Sal. Soda, Sal. Ammoniac (lump), Rosin, Lime.

Extra valves, pipe and pipe fittings, shovels and scoops. An assortment of small tools, hatchets, wrenches, machine hammer, pipe tools etc.

Cans and cases, lacquer, labels, box and shipping stencils, stencil ink and brush, paste and brushes, nails, brooms, stable brushes.

There will be required to operate this plant: One Sub-Processor, one Kettle Man, one Fireman and Steam Fitter, four Cappers and Tippers, one Warehouseman and one Shipper and 40 to 80 hands.

This plant may be greatly improved so that a much larger variety may be packed by adding 10-horsepower engine and replacing the steam exhaust box and the exhaust tank with a continuous exhaust steam box; the two dump scalders with a power scalder; the hand crane with a power crane and adding a pea huller and grader; a small corn line, comprising cutter, cooker and filler. A steam oyster box, with a suitable outfit of tracking and cars, may

**Not required in plant equipped for sanitary cans.*

be installed on outside of building under a shed for use in preparing crabs, clams and oysters.

Thus equipped, this factory is capable of preparing and processing about every variety of food products that are likely to be found in any one locality, and, if properly conducted, of handling them in such an economical way that for their own local and immediate markets all competition from outside concerns may be met.

SANITARY, OR OPEN-TOP CAN EQUIPMENT.

A more simple and less expensive plant, and in general, more up to date would be one equipped to handle "sanitary" or open top cans. Less machinery is required and fewer hands to operate. For such a "sanitary' plant those supplies marked with an asterisk (*) in the above list would not be required. As the cans would be closed without heat or solder, none of the requisites for those would be needed. But either an engine or an electric motor would be necessary to drive the sealing machine, and a power exhaust box is needed.

In the use of the "sanitary" can system after the cans come from the exhaust box they pass, automatically, to the sealing machine, which fastens on the tops and they are then ready for the process; thus doing away with the necessity of putting on caps, using flux, capping and tipping, reducing the amount of handling and the consequent liability of imperfect work.

The above applies in the same way to the larger plants, as described in the following pages.

PEELING TABLES.

For peeling tomatoes, in particular, the tables should be built to slope to the center to an opening entering into a drain. The scalded tomatoes should be brought to the peelers in pans, rather than buckets, and be peeled from these pans, the skins being dropped back into the pans and the peeled tomatoes into special buckets, used for this purpose only. This will avoid the slop and wet incident to peeling tables where the tomatoes are thrown into bins or troughs, and the skins into other gutters in the tables, and pushed out at the end by paddles. These pans may be emptied into conveyors, at the end of the line of tables, which will deposit the skins and refuse in the slop cart, to be removed at once.

THE PROPER TOMATO SCALDER.

If you intend using the hand dump scalder, install at least two, if not three, of them, so that a quick change from one to the other may be made and the water in which the tomatoes are scalded *kept clean.* If you do not want your goods seized by the pure food authorities and destroyed as unfit for human consumption, see that the water in your scalder, whether hand-dump or power, is kept clean. This can only be done by frequent changing. In using two or three such scalders one may be used as a washer, the tomatoes being first rinsed off in it and then scalded in the next one. Keep the surroundings of these scalders as clean as possible.

A MODEL CANNING FACTORY (Power)

The floor plan presented in the back of this book gives a scheme for the installation of the permanently fixed machines and apparatus for a plant having a capacity of 20,000 to 25,000 cans daily, suitable for an all-the-year-around pack, covering an extensive line of products and so equipped as to employ as much labor-saving machinery as can be worked advantageously with a minimum of manual labor, and producing satisfactory results both in regard to economy of operation and appearance of finished goods.

THE PEELING-ROOM.

In the peeling-room is to be placed the special machines and apparatus employed, which are set, moved or taken down as the requirements of the different seasons demand. For convenience in referring to it, this room has been divided, as shown by the lines in the plan, into blocks 4 feet square, numbered from 1 to 312, and the proper position of such machines and furniture required in the handling of the various products will be designated by the number of the block or blocks in the text treating on the article to be packed. The peeling-room, 48 feet x 104 feet, beside the movable apparatus, also contains three jacketed copper kettles and the receiving clerk's office, outside of which a four-ton wagon scale is located for weighing the loaded wagons, having the scale with the beam in block No. 277.

CAPPING AND PROCESS ROOMS.

The Capping-room, 30 feet x 64 feet, and *process-room,* 14 feet x 80 feet, may be combined in one room, 50 feet x 64 feet, if a shorter cooling tank is used, but the present rooms arranged in an L are preferable. The permanent fixtures and machines in these rooms include two automatic, single line, capping systems,* each comprising a continuous steam exhaust box, can wiper, can placer, acider, capper and can tester; a hand-capping line *for heavy syrup goods and irregular cans, equipped with capping table, continuous steam exhaust box, tipping table, and, if desired, a continuous conveyor open-water bath or sterilizer, or an automatic Continuous Cooker, which takes the place of the process kettles. This is the most up-to-date method, greatly simplifying the operations.

The Automatic Continuous Cooker is designed to reduce the amount of handling of the cans, and by doing away with the process kettles to make the operation continuous. The cans roll from the capping and tipping system, or from the Sanitary Sealing machines

**Not required in plant equipped for sanitary cans.*

into the Cookers and the processing or cooking begins at once. Moreover, it is claimed for the several machines now on the market that a considerable decrease in the length of cook is effected through the agitation of the contents of the cans while cooking. The saving in labor and the amount of steam used make them valuable considerations. They have proved very effective upon fruits and such vegetables as require comparatively low temperatures, but are untried, as yet, on processes requiring from 240 degrees up.

In the process-room are seven retorts 40 inches x 72 inches (set in floor with working platform in front), in single line with power traveling hoist over head for handling crates; also a cooling tank equipped with either a continuous conveyor in bottom or overhead.

If an overhead tramway is adopted for the tank, it may be arranged to continue to the warehouse, and by use of suitable tracks and switches the crates may be delivered to any desired point. The boiler-house, located at the side of railroad convenient to the coal supply, should have two 50-horsepower boilers (see Boiler Capacity). Either the main siding or a spur at this point should be elevated on trestlework for convenience in unloading hopper cars. If the main siding is elevated in this way, continue it so to the end of peeling-room, where tomatoes may be unloaded in a shoot discharging directly into the washer and scalder.

THE ENGINE-ROOM.

This is also to be used for the storage of machines not in service and as a machine shop for general repair work, and to be supplied with a full complement of pipe tools, machine tools, etc., by all means including a portable forge and anvil, a power drill press and a small lathe. The drill and lathe will prove a great convenience and pay for their cost many times over in a season.

The scheme for the shafting and piping of this plant after the machines are in place will readily suggest itself to any practical man familiar with the business, and as such a man *must* be at the head of a factory of this magnitude, it is not necessary to go into the details of this arrangement.

BOILER CAPACITY.

A plentiful supply of dry steam is a very necessary requirement, and a good boiler of ample size should be purchased. Aside from

the initial cost, it is much cheaper to install a boiler of nearly, or quite, double the capacity that you anticipate using. A small boiler, taxed beyond its capacity, will consume more fuel in proportion, much of the time will deliver wet steam and be more likely to break down at critical moments. In large plants where steam is used in several departments, especially if the departments are situated on different floors, it is economical to use high pressure boilers up to 180 to 200 lbs., with properly adjusted reducing valves placed between the boiler and department mains. A factory designed to operate for a long season, or through the entire year, instead of one large boiler should provide a battery of two, each of sufficient size to run the factory at its full capacity. The extra cost of two is more than offset by the fact that the disabling of one will not cause a shut down of the plant. This is particularly true when the factory is at some considerable distance from its base of supplies, for as the ratio of time distance from the base of supplies, so is the comparative cost of a breakdown during the packing season. Regarded in one sense, the installation of two is a practical method of insuring against possible loss of time and raw material, the premium on the policy costing only the interest on the extra money required for two boilers instead of one. It is, of course, understood that when both boilers are in order they are to be run as a battery, not singly, thereby obtaining virtually the same advantages as from one large boiler.



SUPPLIES

CANS.

As containers for all varieties of fruits and vegetables, cans, constructed of tinned iron or steel plates, are universally used, but with a great many glass jars or bottles are preferred for fancy or extra fancy goods.

The question of purchasing the cans from canmaking concerns, or of making them by the individual packer, is of such a complex nature that the packer must carefully study the matter and decide for himself. Speaking in a general way, in many instances it might be advantageous for the larger factories to make all, or a portion of their cans, and buy cases in shooks. Small concerns will find it cheaper to buy cans, having them shipped either packed in bulk or in the regular can cases, which cases may be, at a small extra charge, neatly printed, thus presenting a more attractive appearance than when stenciled. In solving this question of making cans, place on one side the cost of manufactured cans and freight and an allowance of two cans on each thousand for leaks; on the other side the cost of tin plate and freight, the wear and tear and repairs to machinery, the interest on money invested in machinery and an allowance for deterioration of plant with no allowance for leaks, to which add the cost of labor in making cans. The difference between the two should be a guide as to the financial aspect. In many places, however, another factor in the case would be of prime importance and might more than counterbalance any slight financial difference; the employment of hands, especially valuable or indispensable during the packing season, in canmaking during the dull or closed season, who otherwise might seek other vocation and would be missing when their services were most urgently required. These points are but a small portion of the factors influencing a decision, and each packer must decide for himself the question of buying or manufacturing.

The use of the old hand-made, inside soldered can has been, except in rare instances at the present time, abandoned principally owing to their greater cost, though the prime factor in the movement to drop them was the prejudice against using goods packed directly in contact with the solder. This leaves as the principal types to be considered the outside soldered or "floated" cans (which may be made entirely by machinery, by hand, or by a combination of machine and hand work) and the sanitary cans. Properly and carefully made floated cans are free from the principal objections urged

against the old style cans, but they should be rinsed with water to remove to the last trace any flux or dirt which may be present.

Practical, automatic can-washing machines are now on the market, and unquestionably the time is now here when all cans must be thoroughly washed before filling or using.

Sanitary cans are free from some of the objections urged against soldered cans, and are peculiarly adapted for packing whole or sliced pineapple, whole tomatoes or any article apt to be crushed or injured in filling through a regular can opening. Made and closed with the improved machinery and appliances now in use sanitary cans appear to stand on an equality with floated cans so far as the safety and security of the packing is concerned. Naturally after filling, having the entire top open, unless carefully handled, the liquid contents are apt to slop over while being exhausted and transferred to the closing machine. After processing, owing to the bodies projecting beyond the tops and bottoms similar to the chine of a barrel, it is necessary, in order to avoid rusting by action of the water retained by this projection, to lay the cans on their sides instead of piling on end. Except for specialties and special packs, do not purchase odd or irregular shapes or sizes of cans. Supplies and machinery usually made and carried in stock generally conform to the measurements of the standard sizes adopted by the Baltimore Canned Goods Exchange, which are as follows:

	Diameter	Height.
No. 1 cans	2 11-16 in.	4 in.
No. 2 cans	3⅜ in.	4 9-16 in.
No. 2½ cans	4 in.	4¾ in.
No. 3 cans, 4⅞ in	4 3-16 in.	4⅞ in.
No. 3, 5 in	4¼ in.	5½ in.
No. 3, 5½ in	4¼ in.	5½ in.
No. 10 cans	6 3-16 in.	7 in.

SANITARY CANS.

No. 1 size	2 11-16 in.	4 in.
No. 2	3 7-16 in.	4 9-16 in.
No. 2½	4 1-16 in.	4¾ in.
No. 3, 4⅞ in	4¼ in.	4⅞ in.
No. 3, 5 in	4¼ in.	5 in.
No. 3, 5½ in	4¼ in.	5½ in.
No. 10	6 3-16 in.	7 in.

(Always refer to cans by number, never by pounds.)

These regular cans are stock sizes and may be procured with openings of various diameters suitable to the character of the article to be packed. The size of openings, with the usual trade designation, the average amount of solder* required for capping and tipping

Not required in plant equipped for sanitary cans.

1,000 cans by machine and the number of pieces per pound of drops or segments for hand capping are given in the following table:

Trade Designation.	Diameter.	Solder per 1000.	Number of drops or segments to 1000
Small Hole,	1½ in.	5½ lbs.	220
Medium Hole,	1¾ in.	6½ lbs.	180
Peach Hole,	2 1-16 in.	9 lbs.	140
Pineapple Hole,	2 7-16 in.	10 lbs.	115
Extra " "	3⅛ in.	11½ lbs.	100

No. 1 cans are not made with larger opening than 1¾ in.; No. 2 cans 2 7-16 in.

When shipped in bulk the average car will contain about 85,000 No. 2 cans, or 55,000 No. 3 cans. When shipped in cases will average about 54,000 No. 2 cans or 2,250 cases and 36,000 No .3 cans or 1,500 cases.

The sanitary cans require no solder etc., the tops coming with them.

THE STOREHOUSE FOR EMPTY CANS.

The storage house must be protected from dampness and steam and should be at such an elevation above the packing tables or filling machines that properly constructed chutes will deliver the cans, by gravity, to points where they are filled. When storing cans in bulk in bins, lay on side in even and regular tiers, keeping cap end to cap end, or start with the first tier cap end out, the balance with bottom out. When stored in shipping cases, place the bottom layer cap end up, the top layer cap end down.

CAPS.*

Solder hemmed caps are not only most convenient, but cheapest. Do not keep more than the day's supply in the packing or capping room. If more than one size of caps are kept on hand plainly mark each package containing them with the size, style and variety of can which they fit. If not plainly designated it frequently happens that caps not fitted to the cans are used, and while a cap 1-16 inch too large or too small makes little difference in the capping, it does allow a much better opportunity for the flux to get in and contaminate the contents of the can, particularly so when the flux is applied by hand.

SOLDER HEMMED CAPS.*

Solder hemmed cans, made with the proper amount of solder, to properly seal the can, attached to the outer edge, are now generally used for the reasons that the exact amount of solder is always just where it is wanted, there is no waste of material by careless

**Not required in plant equipped for sanitary cans.*

hands, and in competition with drop solder and plain caps they save considerable in time and labor. Moreover, the cap edge is protected from rust, and they will not be taken away and sold as readily as solder.

FLUX.*

The advertised fluxes and soldering fluids all appear to contain more or less of the salt formed by muriatic and zinc (chloride of zinc), but generally in a purer state than that obtained in home manufacture, which is likely to be contaminated with a minute proportion of arsenic, and it will, therefore, be found cheaper and better in the end, to employ one of the well-known brands now upon the market than to try to make your own.

SOLDER.*

Solder is composed of lead and tin combined in various proportions—half and half for hard solder, 9 parts tin and 10 parts lead for medium, and 8 parts tin to 10 parts lead for soft. The finished article may be purchased in the form of rectangular or triangular bars, wire, wire segments or triangular drops. In the form of wire, wound on spool, it is used for power capping machines and is a convenient shape to use in tipping. For hand capping triangular drops are ordinarily used, though wire segments are preferable, as they melt more readily under the capping tool.

SOLDERING IRONS.*

In adjusting Tillery tools, first place shank of copper in holder, then push rod through handle and insert end in tip hole of can and while holding it perfectly erect bend shank so that the copper will drop into solder crease. Then fit end of copper to solder crease by placing in fire pot, first removing rod, and heating red hot, place on forging "stake," a small anvil with a long, slender break, and beat with hammer into a curve into which a cap that corresponds with the solder crease will exactly fit. Cool the copper file bright, at same time filing the edge of the curve to fit the dip of the crease; then tin the copper by heating red hot, dip in muriatic acid or flux and rub with hard stick solder, and so continue until the copper takes a smooth coating of tin.

Another method, which, though more trouble, produces better results, is to make a hollow in a soft brick, fill with scrap solder, adding a bit of rosin and a pinch of sal ammoniac, heat the copper red hot, dip in flux and rub in this mixture until it is coated with tin. When the solder is melted much of the lead is absorbed by the porous brick, consequently the metal taken by the copper is nearly pure tin, which will work more smoothly and adhere much longer than the coating obtained by the first method.

**Not required in plant equipped for sanitary cans.*

TIPPING COPPERS.*

Tipping coppers should be forged and filed to a point and tinned in the same manner. After considerable use the tinning will wear or burn off; if the copper then refuses to take tin, dress down with a file and retin in the way before described. After long use the copper becomes burnt, rough and porous; heat red hot and forge body on anvil; forge and file point into shape and retin. Capping steels are preferred by most cappers and must be purchased to fit the solder crease for which they are intended to be used.

TO TIN STEELS.*

Place two parts sal ammoniac and one part scrap solder two inches deep in an iron pot or section of an old can; heat the steel, dip in flux and revolve in this mixture until it is tinned, then dip in flux and it is ready for use. When the steels become rough and porous, place on a lathe and turn down to the proper shape.

CAPPING TRAYS.*

Where hand capping trays will be required for transferring the filled cans from the packing machine or packing tables, these will be found best when constructed of hardwood, ½-inch stuff for sides, ¾-inch by 2-inch slats in bottom and 1-inch ends. Make them 2½ inches deep, inside measurement, strap with band iron and on either end fasten a 1-inch by 1-inch strip as a handle. Make trays to fit each size of cans packed. If cans do not fit into trays snugly they will move and slop contents when cleaning and wiping, thus entailing much extra labor. Trays of sizes convenient for handling will contain 6 one-gallon cans, 15 No. 3 cans, 24 No. 2 cans or 32 No. 1 cans.

FIRE POTS.*

Fire pots for heating coppers and steels may be successfully operated by any of the various heating systems built for this purpose, but these must be carefully handled. Where power is not constantly available, and for small plants, the direct gasoline system is probably the best. The systems using coal, or city gas, natural gas, gasoline gas or kerosene oil, by either the suction or gravity system require a constant flow of air under pressure. When a factory is started in a moderate way with the ultimate intention that, should the venture prove successful, a capping machine would be purchased, it is best to install one of the gas systems at first in order to avoid loss of time and money in subsequently changing the method of heating.

Any style of fire pot may be employed, but those lined with fire clay or asbestos are most economical, as they retain the heat much better than plain iron and are not so likely to cause a fire should they

**Not required in plant equipped for sanitary cans.*

come in contact with woodwork or other material. The fire pots should be placed within convenient reach of the operators, and where the construction and fitting up of the building will allow, should be suspended by iron straps from above at a height of 6 feet 6 inches from the floor, instead of being placed directly on the capping bench, as is usual.

Each individual capper and tipper should be provided with a separate fire pot and held responsible for its condition, as well as for the coppers or steels used by them.

THERMOMETERS.

Both thermometers and gauges should be frequently compared with standard instruments known to be correct. Thermometers particularly should be tested every year.

According to "Kent," under ordinary conditions at the sea level the air pressure is 14.7 pounds per square inch, and steam is formed at a temperature of 212 degrees Fahrenheit; gauge pressure will give temperature as follows:

Gauge pressure: pounds per sq. inch.	Degrees Temperature F.
0.304	213.0
1.3	216.3
2.3	219.4
3.3	222.4
4.3	225.2
5.3	227.9
6.3	230.5
7.3	233.0
8.3	235.4
9.3	237.8
10.3	240.0
11.3	242.2
12.3	244.3
13.3	246.3
14.3	248.3
15.3	250.2

If your thermometers and gauges do not agree with this table, have them tested.

LABELS.

Labels are generally abused in a canning house. Provide a dust and steam-proof room of such dimensions and so arranged that each size and variety of label may be separate by itself in a bin or pigeon hole. Have the shelves of generous width, so that labels when stored crosswise will be entirely supported and not hang over the edge. When labels are received wrap each bundle in paper,

pile on shelf neatly and squarely, printed side up. Insist that loose labels when returned to the shelves be neatly placed and not thrown in promiscuously. Give one person entire charge of the labels and the room and hold him or her responsible for condition of the stock.

In purchasing labels, remember that "well dressed is half sold," and that a neat, attractive and distinctive outside label costs but a trifle more per dozen for the finished goods than the gay and gaudy stock affairs that at once stamp the goods as being cheap.

"Honesty is the best policy" is an old adage that apparently many packers have forgotten. Whilst honesty may seemingly not pay at first, in the long run it will pay to be honest in labelling goods correctly. A consumer may buy first through the eye, then through the smell, then through the taste in certain lines of food products, but in canned foods one must buy through the eye or by reputation of the brand. Neither the fine label nor the previous reputation of the brand will hold the consumer as a customer if seconds are branded firsts. It is advisable to have distinctive labels, registered or copyrighted, both to protect yourself from imitations and to avoid the appearance of having imitated the design of some other concern of whom you have probably never heard.

Label cans with cap end down, and, if labeling by hand, allow, if possible, sufficient time for the paste to dry before casing. Protect expensive labels, such as gilt and embossed with an outside wrapper of tissue paper. The modern factory uses a labeling or wrapping machine for this work.

Required Weight on Labels.

(*See laws in back of book.*)

MINOR SUPPLIES—SALT.

Salt is a chemical on which many canners try to save money, and usually lose more than they save, by purchasing a cheap grade, which generally contains a greater or less percentage of sulphates, giving the salt a distinctly bitter and disagreeable taste. Pure salt tastes sweet when first placed on the tongue and leaves no unpleasant, bitter after taste. The salt of which the first taste is bitter is not fit for canners' uses.

Last but not least in these preliminary remarks is the subject of cleanliness. "Cleanliness is next to godliness," but, as applied to a canning house, it will have to come before profitableness.

After each day's run, every machine, every crack, corner and crevice of the packing-room and shed where slop and water can flow and collect must be thoroughly cleansed and flushed with an abundance of water. If the floor is of such a character that slop and water will drain through to the ground, a lavish use of disinfectant is required once a week in cool weather and every day in hot weather.

For this purpose a plentiful sprinkling of dry-slacked lime may be used, though varbolated lime (made by thoroughly mixing 1 pint crude carbolic acid with a half bushel dry-slacked lime) is preferable.

GENERAL DIRECTIONS

SAVING AND PEDIGREEING SEED CORN.

By Richard Dickinson, Eureka, Ill.

The proper care of seed is one of the most important and the most neglected of any process of the canning business. The enormous growth of the industry the past generation has made it difficult to give sufficient attention to the production of seed. Also, the old methods of saving seed are not sufficient for the large quantities now required. The result is that many canners have found it so difficult to produce high-grade seed that they have grown careless in this respect. In consequence, some canners buy all their seed, sometimes at great expense and frequently having trouble because they are unable to secure the same strain as that previously used. Buying is better, however, than such saving as that described by the proprietor of a large factory, who said they always planted more corn than they expected to be able to pack, then whatever part matured too fast was left to stand for seed. When it was fully ripened in the field, it was shucked and hauled to the crib, and in the winter, when it was convenient, was shelled with a power sheller.

Such methods of saving seed corn help to keep up the old fallacy that seed corn which has been imported to any locality will tend to run down after a few years of its new environment. This belief is correct only to the extent that any seed tends to vary in type and adjust itself to new climatic and soil conditions, unless care is used in selection of the seed so as to preserve the original characteristics. On the other hand, it is now the generally accepted belief of most field corn breeders that seed corn imported from any considerable distance, especially if it undergoes a change of latitude, will take at least two or three years to become sufficiently acclimated to make its best yield.

Another phase of this belief is the idea that canned corn produced from seed grown in the East, especially in New England, will have better flavor than corn of the same variety grown in the same locality, canned in exactly the same manner, but produced from seed grown in the Central States. This claim has been challenged for some time by Western canners who grow their own seed, and during the coming season will be made the subject of experiments to determine from actual tests whether there is any difference in flavor due to the locality in which the seed corn is raised.

In saving seed corn through most of the sections devoted to corn canning, the danger of frost makes it always desirable and often necessary to gather the seed before it has fully matured in the field. On this account it must be dried after gathering, for which purpose some growers use racks or tie it up with strings. These methods will do for small handlers, but lack capacity

for the canner. Some growers use a crib with tight sides and a false slatted floor, through which air is forced by a blower for a week or more after storing the corn. But this has the disadvantage that the pressure of the ears touching each other prevents prompt drying and promotes mold at those points. This objection also applies to the custom of storing in crates, unless the crates are very shallow, in which case the capacity is limited. A much better method is to stick the ears up on pegs so that no two touch each other. Patented hangers are on the market for this purpose in the form of iron rods with wire points, upon which the end of the cob may be stuck. A home-made appliance which is cheaper and which has proven very satisfactory is a strip of wood one by two inches inside and of as great length as will hang from the ceiling of the seedhouse, into which ten-penny nails are driven from both sides at such an angle that when the strips are hung from one end the pointed end of the nail will make an angle of about seventy to eighty degrees with the vertical. The nails can be placed about three to four inches apart and the strips hung close together so that with the ceiling about twelve to fourteen feet in height, corn can be stored at from fifty to one hundred ears to the square foot of floor space and be thoroughly and satisfactorily dried. Artificial heat is desirable in damp or very cool weather; the temperature should not be allowed to fall much if any below fifty degrees until the corn is thoroughly dried.

Of course, all moldy ears, nubbins, ears showing mixture of field corn and other undesirable types are previously culled out so that the hangers are used only for good seed corn. It is good practice in gathering seed from the field to snap the ears off in the shuck the same as for canning and finish the husking at the seedhouse in order to prevent shattering and bruising.

When dry, the butt and tip of each ear should be shelled off and the grains examined for mold or other imperfection which has not been apparent before. If the grains at both ends of the ear have a bright appearance, then shell the balance of the ear into a pan and look over the corn after being shelled. It is often possible in this way to reject an ear having moldy or blemished grains in the center which would otherwise have gone into the seed unnoticed.

After shelling, the corn should be fanned with a strong blast to take out chaffy and other light grains, then graded for size so it will drop uniformly in the planter. As soon as shelling is well under way, test a few samples for germination to see if your inspection was careful enough. If you find it difficult to secure a high percentage of germination by this method then test each ear before shelling. There are various good systems and apparatus for doing this. Professor Holden, of the Iowa Experiment Station, has developed a very good one and is a strong advocate of this method of testing.

The common practice of selecting seed at shelling time, however, enables one to judge only as to the appearance of the ear. It gives no information in regard to the yield, the style of stalk, or the uniformity of quality or time of maturity of the ears produced.

To determine these latter points some growers go into the field just before harvesting the crop and mark certain select ears, choosing the larger ears from hills having two or three stalks as probably having exceptional vigor; also, since the examination is made just at the time of ripening, it is possible to make a selection for uniformity of the time of maturity as well as for type of stalk and other characteristics of growth.

This method of selection is founded on the tendency of sweet corn, like all other plants, to reproduce itself. It is well known, however, as anyone will notice when looking through a field, especially if he is selecting seed that there is always a considerable tendency to vary from the type of seed that was planted. These variations, or "sports" as they are termed, are the basis for new strains and varieties, by taking advantage of desirable variations from

the normal and propagating them for several generations with careful selection. This work, however, is the province of the seedsman rather than of the canner, and need not be dwelt upon here. The important point in this to the canner is that there is a very marked difference in the production of these variations by different ears. In fact, the difference in individuality of different ears is one of the most striking discoveries of the student of corn breeding. An ear having every desirable characteristic will often produce a very small yield of undesirable ears, while a poorer appearing ear will show a large and uniformly desirable progeny. A study of the performance of different ears recalls Mark Twain's saying, "You can't tell how far a frog can jump by looking at the frog."

Some ears produce a variety of types, while others show a strong tendency to reproduce their own characteristics without variation. Having once secured a satisfactory type of seed, it is this latter quality that is desired. This inherent tendency is discovered and taken advantage of by what is called the "ear to row" test. That is, plant selected ears, embodying the desired characteristics in a separate plat, one to each row, taking care that the soil is uniform and that the whole plat has absolutely uniform cultivation. In order to secure a uniform stand it is well to plant three or more grains to the hill and after the corn is up, thin out to two stalks per hill. During the growing season, watch the manner of growth and character of stalks, the setting of the ears and time of maturity. Finally, gather each row separately, and note the variation in yield and in the character of the ears produced as compared with the parent ear. Thus rows which show a poor habit of growth, unevenness in maturity, a poor yield or a marked tendency to vary from the type of the parent ear should be rejected entirely. From the rows showing high yield and uniformity in time of maturity, select the best ears; that is, those which are the nearest to the exact reproduction of the parent ear, and plant these in an "ear to row" plat the next year. The balance of the ears in those desirable rows should be shelled up together and planted in a propagating or multiplying plat in order to produce seed for the general crop of the year after. The "ear to row" plat should be planted in the center of this multiplying plat, as this has been proven by practice to be the most satisfactory way of isolating it from the pollen of other varieties of corn which might mix with it. The close proximity in one row of a number of plants, all grown from the same parent ear, creates a danger of inbreeding by self-pollenization, which is overcome by de-tasseling half of each row, alternating the ends, so that the half which bears tassels will pollenize the de-tasseled rows adjoining it. The tassels should be pulled out rather than cut or broken off, as the wound will bleed badly if made above the protecting leaves. It is good practice, likewise, to de-tassel all the weak, late stalks in or near the plat.

The first year of the "ear to row" test determines which of the ears planted has the power to transmit its own characteristics to its progeny. The next year's "ear to row" test, using these ears which have inherited the parent ear's characteristics, will show which of them have also inherited from the parent ear the power to transmit those characteristics to their progeny. Thus the continuation of the test for a term of years tends to eliminate the undesirable traits and to fix the desirable features, thus producing an improved and persistent type.

Does this seem difficult to accomplish? It has been criticized as being a great deal of work with somewhat problematic results. It seemed so to me on first sight, but, being dissatisfied with the limitations of our selection, I concluded to try it. The first year I planted twenty of as nearly indentically uniform ears as I was able to select, and I was astonished at the results. To begin with, one row of the twenty showed a shorter but more rapid growth and matured from five to seven days before the balance. On gathering the crop, I found a difference of yield ranging from seventeen

and one-half pounds to thirty-two pounds of dry corn produced, the average being about twenty-six pounds, with a corresponding difference in the type of ears. One row showed a considerable mixture of field corn, no trace of which had appeared in the parent ear. The knowledge that the very best ears I could select had such wide difference in their inherited ability to reproduce their own good qualities decided my case in favor of a careful campaign to eliminate the poor ears.

There has been a considerable study of the breeding of sweet corn seed by the experiment stations of Wisconsin, Maine, Maryland and the National Department of Agriculture. The Illinois Station has made a very exhaustive study of the effects of breeding on the corn plant in general, and many of their results are of quite as much interest to the grower of sweet corn as of field corn. Their studies are also of interest in showing the remarkable results which may be obtained in a few generations by means of the "ear to row" test. For example, in one experiment selection was made for varying the height of the ear above the ground, and in five years' selection the average height of one type was two feet one inch, while the average of the opposite type was five feet four inches. In another experiment, for varying the angle with the stalk at which the ear is borne, it was possible in five years' selection to produce one type which stood at an angle of thirty-one degrees, while the opposite type showed an angle of one hundred and eleven degrees. Of course, these two experiments are of no particular advantage to the grower of sweet corn, except as they show the possibilities of this system in determining which ears have the power to reproduce desirable characteristics and in fixing these characteristics permanently in the seed. The experiment regarding the angle at which the ears are borne is of interest also because it was found incidentally in these tests that the percentage of moldy and decayed ears was less than half as great in the declining as in the erect ears, due presumably to the better protection of the declining ears from the weather.

Those desiring to make a further study of this matter are referred to:

Bulletin No. 127, of the Bureau of Chemistry, U. S. Department of Agriculture.

Bulletin No. 415, Farmers' Bulletin E, U. S. Department of Agriculture.

Bulletin No. 183, Maine Agricultural Experiment Station.

Bulletin No. 120, Maryland Agricultural Experiment Station.

Circular No. 18, Wisconsin Agricultural Experiment Station.

Bulletins Nos. 96, 119-128-132-148 of the Illinois Experiment Station.

In conclusion, don't try to select seed corn by the appearance of the ear only, but use the 'ear to row" test to determine which ears have the inherent power to reproduce themselves in their progeny. Select by performance, not by appearance. I would much rather plant a common-looking ear from a good row than the finest appearing ear from the general field. Select the best ears from the best rows for the next year's plat. Plant the balance of the ears from the good rows to produce seed for the general crop of the year after. Gather the seed before danger of frost, husk it at the seedhouse, sort and hang up all the ears not thoroughly dry, using artificial heat if necessary. Discard the butts and tips and shell each ear separately, inspecting the shelled kernels before accepting them. Fan thoroughly and grade for size so it will plant uniformly. Test your seed to see if it will grow. Don't guess—find out! This is work, but it is interesting work and it is worth while.

FILLING.

Depending on the nature of the article, the requirements of the trade, or the supply of labor, cans may be filled by machines or by hand. Hand filling is more costly, but will naturally turn out some goods more carefully selected, evenly graded and of more sightly appearance than will be the case with machine work. When filled by machine, cans should be frequently weighed and examined during the operation to be certain that they are averaging the amount of materials required. In hand filling each can should be weighed.

EXHAUSTING.

Cans filled with cold liquid should be exhausted—i. e., heated to a temperature of 120 degrees to 180 degrees, depending on the nature of the substance, either directly before or after capping, but preferably, except with tomatoes, after capping. This process of exhausting, which expands the liquid contents of the can and drives out a portion of the air, has no effect on the keeping of the goods, but the cans are not so severely tried in the final process. Defective cans, which have been exhausted, or, what is equivalent, filled with hot liquid, are much more readily detected after processing than "cold packed." Moreover, cold-packed goods, in time, are quite likely to resemble "springs" and are apt to be rejected by both dealer and consumer. When goods are cold packed, more carefully made and stronger cans should be used than are usually employed when cans are exhausted or hot filled.

The exhausting of cans previously capped may be accomplished by piling the trays containing the cans on a truck and placing in box where they are subjected to the action of steam at a very low pressure for a specified time, or by placing them one tier deep in a shallow or exhaust crate and submerging in a tank of boiling water, removing after the directed time has elapsed and tipping as quickly as possible thereafter. In this connection, it must be noted that from the time cans are filled with hot liquid or exhausted by any method they must be kept in speedy and *constant* motion until in the process kettle. This is the danger period when germs—bacteria, which are not destroyed by the final process—are developed in the goods or absorbed from the air. Any process or operation which lengthens this period increases the danger, consequently a long tank containing boiling water, or a tight box with open ends into which live steam is injected, equipped with an endless chain carrier, is preferable to either of the first methods, as it aids in making a continuous instead of an interrupted operation. The steam exhaust should be used for sweet potatoes and other dry-packed goods: also for cans exhausted before capping. The question of exhausting before or after capping is open to discussion, but the consensus of opinion as generally expressed is that it is best, especially with fruit, to first cap, then

exhaust whenever the varieties packed will allow such an arrangement of the factory. It is granted that a hot can will be capped more readily and cheaply than a cold one, but the goods capped previously retain their flavor, shape and appearance better and the period between the exhaust and process is lessened.

When using sanitary cans, the exhaust must be given, as a matter of course, *before* sealing; and experience has proven that exhausting sanitary cans is always necessary—an important point in this respect.

CRATING.

After tipping, pack the cans in process crate, cap end up, and at the same time count and record the variety, grade and quantity. Attach to the crate a metal tag so stamped or marked that the article and grade may be readily determined by the processor and warehouse men to whom it is delivered.

STAMPING OR IDENTIFYING.

Every can should be stamped or an identifying mark placed on it as soon as capped, in order to avoid mixture in the warehouse. There are a number of little machines now on the market by which each can may be indelibly marked with any legend desired. Thus it is possible to place on each can the name of the goods, the quality and the date, if desired, the code being secret. This also guards you against imposition through the rejection of other goods as yours: and in any action by the pure food authorities enables you to identify your goods. It is cheap insurance, but important.

CAPPING THE CANS BY HAND.

After fluxing and placing solder in crease, first partly withdraw or entirely remove the rod before placing the copper or steel in fire pot; heat until it is uncomfortably hot when held within a half inch of the face and will hiss and make steam when dipped in and quickly removed from the flux. When capping with coppers in Tillery holders, place the solder in the crease on the side farthest away from the operator: take copper from fire, insert rod, noticing that the slit in end is not closed; dip momentarily in flux and place centre rod in tip hole; hold the cap firmly in position, but with not enough pressure to spring cap; place the copper on solder, and when melted, turn handle quickly, giving the copper a quarter turn to right, then a half turn to left, then a full turn to right, followed by a full turn to left. Solder will first melt and then flow, presenting a perfect level and fluid appearance in the crease when uniting with the tin, raise the copper two or three inches, holding cap in place with gentle pressure on the rod until solder sets. Continue this operation on successive cans while copper holds sufficient heat to readily melt the solder, then dip in flux, place in fire pot and reheat. Handle steels the same way as with coppers, except that after solder is melted make a full turn to the right with the steels, then a half turn to the left.

CAPPING GOODS BY MACHINE.

When the daily capacity of the plant is 15,000 cans or over, it is advisable to use a power capping machine instead of hand capping, though even when a power capper is used it is advisable to cap all heavy syrup goods with coppers. Should a power machine be used on this class of goods, have a special steel made with an extra long body and heat from the shoulder. The machine steels are tinned in the same manner as hand steels, and while the machine is running should be rubbed occasionally with a stick of sal ammoniac.

Full and complete directions are furnished by the manufacturers as to the handling of the various styles of machines, and these will be found the best guidance.

TIPPING BY HAND.

After capping the cans pass to the tipper, who must carefully examine each can for cap leaks, and who is held responsible for any cap or tin leaks which may be found after he has passed the cans. When capping and tipping at a stipulated price per thousand all swells and springs arising from these causes are charged to the tipper and his cappers and the amount deducted from their pay. When working by the week or month a fine is usually imposed. Where a number of tippers are employed it is necessary that each one should, in some manner, mark the cans for which he is responsible. Probably the best method of attaining this result is by the use of steel combs, which when drawn across the caps will leave a slight but an easily distinguished scratch on the surface. It is only necessary to have each tipper use a different number of teeth in the comb to enable the trouble, should there be any, to be traced to the man who is responsible.

The tipper, after overlooking the capping, should touch the tip hole with flux, take tipping copper from fire and dip in flux, place end of copper in tip hole, touch lightly with a stick of solder, give the copper a quarter turn left, a half turn right and remove quickly. Use no more solder than required to fill the tip hole level with the surface of cap. A single drop is sufficient if the holes have been properly punched. Some tippers prefer touching the solder with the copper before placing in tip hole. If this is evenly done it makes neater work. If a dark spot, which will not rub off, appears, retip, using little more flux and solder. In tipping cans, tomatoes particularly, which have been exhausted after capping, it may be necessary to first push the material away from the hole by means of a metal or wooden plug of suitable size before applying the flux and solder.

PROCESSING.

Upon Processing Depends the Entire Pack.

Processing is the term applied to the sterilizing or cooking of the foods contained in hermetically sealed packages. This may be

performed in any vessel of suitable dimensions that can be provided with a constant and easily regulated supply of either boiling water or steam under pressure, during the period necessary to cook or sterilize as the nature of the article or the wants of the market may demand. Wooden or iron tanks, square, rectanguar or round, with perforated coils or crosses in the bottom for the introduction of jets of live steam to boil the water, are used for such substances as do not require a temperature exceeding 212 degrees Fahrenheit. This is known as the open-bath process and the tanks as "kettles."

For substances requiring a temperature of more than 212 degrees, and when it is desired to hasten the operation with those requiring less, iron tanks of various shapes, round, half round, square or rectangular, placed either perpendicularly or horizontally, fitted with doors which can be clamped down, steam tight, are employed. This is known as the closed process, and the round tanks, placed either upright or horizontally, are known as "retorts;" the square tanks, of whatever dimensions, are usually designated as "steam chests." Steam chests and horizontal retorts are used with dry steam as a cooking medium; upright retorts may be used with dry steam or with water and steam, as preferred. When the capital will allow the extra initial expense, it is advisable to install retorts instead of open kettles. When desired the retorts may be used with lids open, serving the same purpose as an open kettle, and may be equipped with a pump and condenser for the vacuum process which is employed in sterilizing some of the more delicate fruits.

With few exceptions on fruits and vegetables using double the time given at 240 degrees at 212 degrees will give safe results. The important exception is corn, where unless a special method of preliminary cooking is applied, is quite apt to spoil. Of course, it is understood that fish and flesh absolutely require the process at 240 degrees or more.

Occasionally cans of peas and corn will burst when retort is opened—this may be due to imperfect cans or too great a fill. Sufficient room must be left for expansion, remembering that both old corn and old peas will swell much more during the process than the young and tender kinds.

STERILIZATION POINT.

Excepting fish and animal substances, the generally accepted sterilization point is 170 degrees Fahrenheit.

That is, when the ENTIRE contents of the sealed packages are heated to this degree the sterilization is complete and the goods will be preserved indefinitely. This point will be reached much more quickly when processed under pressure, with a consequent saving of time over the open-bath process. Kettles should be fitted with a "pocket" for holding a thermometer, and this pocket should be fitted with a pet cock at the top or bottom so as to insure a perfect circulation around the thermometer end. Otherwise this pocket may be

"dead," and so show a false register on the thermometer. The pet cock in this pocket should be kept at a slight crack, so that a thin emission of steam will always be apparent.

Besides the steam inlet, retorts should be provided with a top steam exhaust, bottom waste and safety valves; also bath thermometers and steam gauge. Upright kettles and retorts may be obtained, either from stock or by special order, of almost any height or diameter; the size usually employed holds three 4-tier crates of No. 3 cans and measures 40 inches in diameter and 72 inches in height.

OPEN BATH.

When processing in water in an open bath fill the kettle about half full of water or sufficient to cover the cans and bring to a boil, shut off steam, lower the filled crates in kettle by any mechanical means, throwing the bails of lower crate on side; turn on full head of steam and when the water boils, the thermometer marking 212 degrees, take the time; cut steam down, leaving valve open just enough to keep up a lively boil; when time directed has expired shut off steam and remove crates from kettle.

CALCIUM PROCESS.

If it is desired to obtain a higher temperature than 212 degrees in open bath, or where the altitude is such that water boils at less than 212 degrees, the result may be obtained by using a solution of chloride of calcium instead of water and heating with a closed coil instead of the usual perforated coil or cross. Turn on steam and bring the solution to 212 degrees or the desired temperature; shut off steam; lower in crates, first washing the cans to keep bath clean as long as possible; turn on full head of steam until the desired temperature is attained, take time, then cut steam just sufficiently to keep bath at proper temperature. When process time has elapsed turn off the steam and remove crates from kettle. Wash off the chloride of calcium by turning on water from a hose or by passing through a cooling tank supplied with a constantly changing stream of cold water.

CLOSED RETORT.

When processing in a retort (closed-top process) with steam provide an overflow pipe connection with the bottom outlet of such a height that the steam inlet will be covered with 1 inch to 2 inches of water, thus supplying wet steam, which will not scorch or discolor the product as will dry steam under any considerable pressure. Close the bottom exhaust, lower the crate in position, close the lid and fasten the clamp or clamps opposite the hinge, then back in order, securing the clamps next the hinge last; open the top exhaust valve and turn on steam; when the steam issues freely, nearly close the top exhaust. Never entirely close this valve; leave it cracked or one spoke open. This allows the escape of gases formed and creates

a certain amount of circulation of the steam in the retort. (In opening the retort reverse the above action, loosening the clamps next the hinge first and those opposite last). It is claimed, and apparently with scientific research, experiments and results to confirm it, that if the retort is closed absolutely tight a gas or gaseous body is formed which envelopes each can, and, acting as a non-conductor of heat, prevents the full action of the steam on the contents. Open the bottom valve just sufficient to allow the condensed steam to escape. When the thermometer marks the temperature desired, take the time, then regulate the steam with valve so that this temperature is maintained. When process time is up, shut off steam, open both upper and lower exhaust valves, and when gauge shows no pressure loosen clamps, throw back lid and remove crates. If desired, a pop valve, sensitive to a half pound, set to blow off at a quarter pound more pressure than the process temperature demands, may be inserted in the lid.

ALTITUDE STERILIZATION TABLE.

Based on 29-inch Barometer with temperature at 70 degrees F. at Sea Level.

Note.—Add time in third column to the process times given in the book.

If you are above Sea Level, determine first how high; then consult table.

Altitude	Water Boils at	Additional Time
512 feet	211 degrees	2 minutes
1025 feet	210 degrees	4 minutes
1539 feet	209 degrees	6 minutes
2063 feet	208 degrees	8 minutes
2589 feet	207 degrees	10 minutes
3115 feet	206 degrees	12 minutes
3642 feet	205 degrees	14 minutes
4169 feet	204 degrees	16 minutes
4697 feet	203 degrees	18 minutes
5225 feet	202 degrees	20 minutes
5674 feet	201 degrees	22 minutes
6304 feet	200 degrees	24 minutes

WATER AND STEAM PROCESS.

When processing in a retort with water and steam, close bottom outlet and fill retort half full of water; bring to a boil; shut off steam and place crates; then handle same as with steam, of course keeping bottom outlet closed.

TESTING GOODS.

Self-registering can-testing thermometers are valuable aids in determining when goods have reached the sterilization point, and are especially valuable for dry-packed corn, which should be tested, if not every batch, at least several times a day. When testing articles packed in either brine or syrup, remember that the thermometer marks the temperature of the surrounding liquid and not the internal temperature of the fruit or vegetable; consequently, good judgment is required in reducing process time, particularly so when goods are cooled, as they always should be, after processing. It is advised that frequent tests be made of the temperature attained during processing, and probably the best and most economical device yet placed on the market is the Self-Registering, Sterilizing Thermometer. These thermometers are fitted to metal caps which are soldered to the regular tin cans, and may be used almost indefinitely by replacing the tins which may become bent, misshapen or rusted from constant use. Cut cans frequently, noting cook, color, weight and general appearance of goods.

PROCESSING GLASS.

Glass jars are best processed in water at 212 degrees or in steam at a temperature not much in excess of this point. During cold weather temper all glassware before filling; it is best to fill with hot liquid instead of exhausting. After making closure, place in water of about same temperature as contents of package; bring very slowly to a boil; take time; when process time expires, turn off steam and allow the water in kettle to cool to about 189 degrees before removing jars. Be careful not to expose the hot jars to a current of cold air, as this will cause excessive breakage. Under favorable conditions a loss of 1 per cent. to 2 per cent. may be expected from breakage in processing and cooling glass goods. Glass may be processed in steam in an ordinary steam exhaust box, or in an extra long continuous steam exhaust box run at the proper speed. Bring the heat up very slowly and cool very slowly.

STERILIZATION—IMPORTANCE OF PROPER PROCESSING.

(Reprinted from THE CANNING TRADE, Issue of January 20, 1911.)

Note.—In this article the terms "retort" and "kettle" are used synonymously since the subject deals with the treatment of canned foods in closed vessels under pressure.

Assuming that all who are engaged in the canning business are familiar with the basic principles of processing, this article will deal only with the methods by which processing can be made an easier and surer operation by the use of modern and up-to-date appliances that make automatic the operations on which scientific processing depends and which cannot be perfectly carried on while relying altogether on manual labor and human intelligence.

If a constant boiler pressure could be maintained at all times and a perfect steam circulation be produced in the kettles a careful processor could, by constant attention, hold the kettles at a fairly uniform temperature. But, since these two ideal conditions are rarely found in a canning plant, what can be done to improve them?

Owing to the variable demands for steam pressure, it is almost, if not utterly, impossible to keep a steady boiler pressure, but the conditions in the boiler-room can be improved by employing a first-class engineer and modern power plant equipment.

Circulation in the kettles: If processing altogether with steam, good circulation is assured by placing a vent in the cover so that a steady stream of steam escapes when the kettle is closed and under pressure. The thermometer pocket should also have a vent to insure perfect circulation around the thermometer bulb, otherwise the instrument cannot give true indications of the temperature existing inside of the kettle.

If cooking in a closed kettle with water heated by live steam, obtaining perfect circulation is more difficult than where dry steam only is used.

In order to produce a uniform pack, it stands to reason that every can in every batch must be exposed to the same temperature for the full cooking period. If this is not done, some of the cans will be either over-cooked or under-cooked. If under-cooked, "swells" will result, because the bacteria, which are always present in food of any kind, have not been destroyed; if over-cooked, the goods will either be discolored or lose their firmness and cannot be classed as first quality or standards.

To obtain this uniform temperature then, in waterbath process, it is essential that the best possible circulation be produced and maintained, and this can be accomplished by the use of a simple but effectual circulating system, which is illustrated by Fig. 1.

By means of the three circulating pipes "D" and the suction created by the force of the steam passing through the jet "C," a rapid circulation takes place, which causes the water in the kettle to flow out the circulating pipes at "A" and into the kettle again at "B." As a result of this constant passage and repassage of the water through the kettle, the water is thoroughly mixed and the cans are sure to be exposed to the same temperature, regardless of

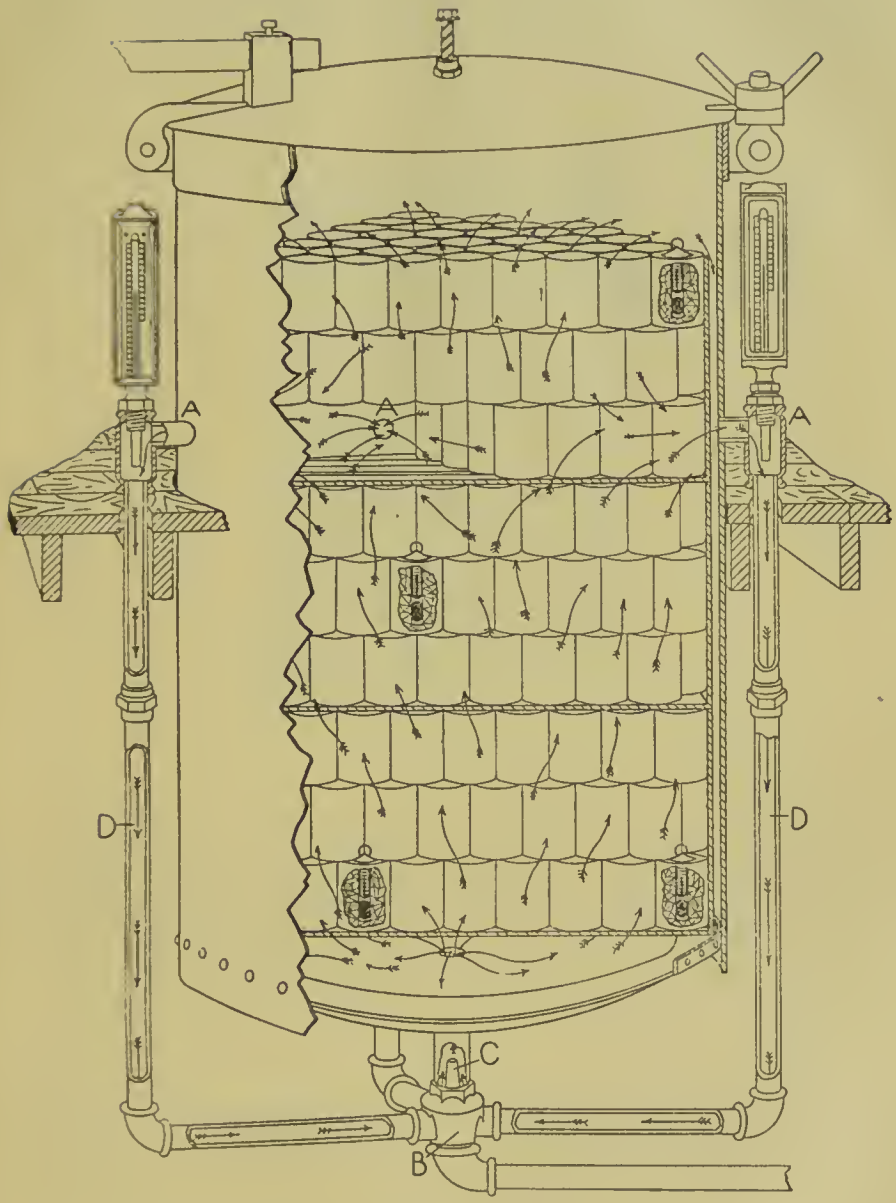


Figure 1.

their location in the kettle. The use of "telltale" can-testing thermometers (Fig. 2) placed in cans in different parts of the crates will give positive information regarding the temperature to which the goods have been exposed, because each thermometer will register the maximum temperature to which its particular can has been subjected during the cook.

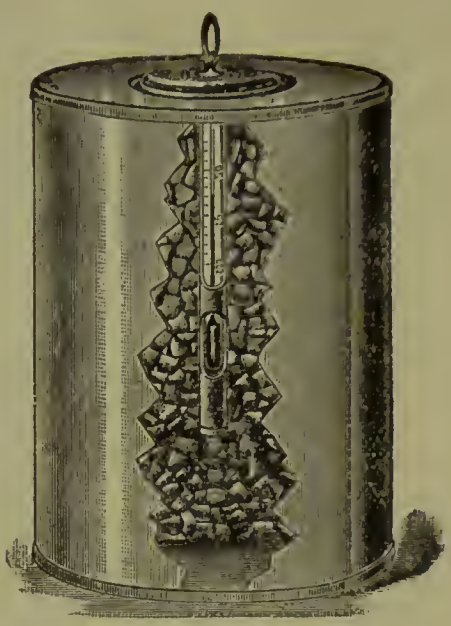


Figure II.

The next step is to control the flow of steam into the retort so that a constant temperature may be maintained. When this is done, by having a man pass up and down the line of kettles, watching the thermometers and adjusting the hand valve according as the temperature has increased or decreased, the same risks are taken which would be assumed in a boiler plant, if, instead of placing safety valves on the boiler, the engineer was wholly depended on to hold the pressure at the right point by constantly watching the gauge.

You may employ the best processor obtainable, but since he is human, you run grave risks so long as you depend entirely on his endurance to do this work for you. During the busy season he is often obliged to work night as well as day, and he cannot give the attention to his work that he ought.

To overcome this difficulty and to reduce to a minimum all chances of loss due to improper control of the steam entering the retort, there exist various automatic or mechanical processing devices.

Two systems of automatic retort control are in use. One, known as the individual retort control, and the other known as the battery control. The former requires that every kettle or retort have its own individual regulator, thus making each regulator independent of every other. The battery control consists of but a single regulator, which is equipped to control the entire battery as a unit. It will be seen, therefore, that in cooking different kinds of goods at various temperatures in the different kettles of a battery, the regulator for battery control cannot be used and the individual regulator is essential.

Aside from this, if the regulator for battery control is in operation and anything goes wrong which requires shutting down the regulator, the whole battery is without the use of automatic service.

If, however, the kettles are equipped with individual regulators and it is found necessary to cut off one of the devices, the only kettle affected will be the one whose regulator is shut down. This kettle can then be operated by hand and the others will continue to run automatically.

Since the cost of both systems is about the same, the demand for the individual for each retort seems predominant, owing mainly to the objections to the battery control which are stated above.

As the individual regulator is in more general use, it will be described and illustrated in preference to the other. Fig. 3 illustrates this form. Its operation is reliable and its construction is simple. The principle by which it works is a counterbalance of steam pressure by adjustable weights. The motive power by which these regulators are operated is compressed air, and if a plant is not equipped with this, air compressors can be obtained of sufficient capacity to operate as many regulators as the plant is utilizing.

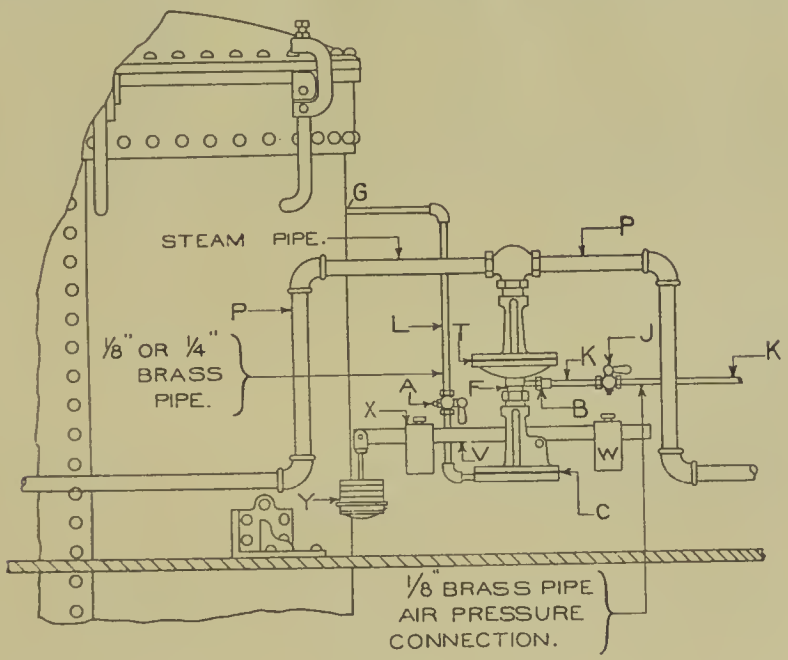


Figure III.

The regulator is suspended from the steam pipe which feeds directly into the retort or kettle. Small brass pipe is run into the retort or kettle and connected to the regulator at point "G." From the air compressor ⅛-inch brass pipe is run and connected to the regulator at "B." By means of the sliding weights "X" and 'W" and the hanging weight "Y," the regulator can be adjusted to the smallest fraction of a pound. At the point "C" is a flexible diaphragm, which the steam from the retort, through pipe "L," tends to raise. The weights, having been properly adjusted for the temperature at which it is desired to control, prevent the steam from lifting the diaphragm until it exceeds by the smallest fraction of a pound the pressure which the regulator is set for.

When the steam pressure does increase sufficiently to lift the weights by means of the diaphragm "C," a valve is immediately opened at the point "F" and the air pressure coming into the regulator at "K," at once inflates another diaphragm at point "T," which instantly shuts off the steam supply at the retort or kettle. The pressure inside of the retort then falls, and as a result the weights on the lever arm force the diaphragm "C" back into place, the valve at "F" drops back, cuts off the air supply, and the diaphragm "T," being forced back into its original position, allows the steam pressure to enter the retort again. This regulator is so sensitive that, by watching the thermometer, it will be noted that the changes in temperature are so slight as to be imperceptible. By increasing or decreasing the weights "Y" and by use of the sliding weight "X" it is possible to control at any pressure desired.

Some of the very largest canning plants in the country are equipped with these mechanical processors, and the reports coming from those who use them state that not only is risk and worry avoided by their use, but that far closer control is obtainable than could ever be hoped for from the old method of hand control. Aside from these facts, the saving of steam is considerable, as well as the saving of help. With the old method the man doing the processing was obliged to put practically all of his time at this work; but, with the use of regulators, it is possible to make his time valuable in other departments.

DUTIES OF SUPERINTENDENT-PROCESSOR.

The duties of the Superintendent-Processor in a plant of the kind now under discussion are clearly defined by the above. As assistants he should have on his permanent staff:—

One Receiving Clerk.
One Kettle Man, or assistant processor.
One Engineer-Machinist.
One Foreman.
One Forewoman.
One Inspector.
One Head Capper.
One Syrup and Brine Maker.
One Sauce and Catsup Maker.

DUTIES OF OFFICE AND FACTORY HEADS.

The duties of the Receiving Clerk are to receive and keep a correct record of the raw materials, supplies, etc., noting that the condition of raw materials complies with the contracts or buyer's agreement; to keep a record of the quantity and cost of all raw material issued to the peeling-room, a daily report of which must be made to the office to be used as a basis in estimating the daily cost of goods packed.

The Kettle Man, to be in charge of the process-room, cooking and cooling, on time given by the Superintendent. He also keeps the temporary and permanent process records.

The Engineer-Mechanic, to run engine, dynamo and pump, attend to pipe-fitting and repair work and such general duties as naturally belong to this department.

The Foreman, to have charge of all outside work and floating male labor.

The Forewoman, in general charge of all female labor.

The Inspector, to examine prepared raw material and issue checks therefor to pieceworkers. The Inspector should be charged with checks given her and credited with all given out and returned by her daily, the office keeping a record of the checks issued for each variety handled for use in computing cost of finished goods.

The Head Capper should be in charge of all work in the capping-room. A record of all work passing through this room should be kept, including size of cans and variety and grade of goods. A daily report of the amount of solder and flux used should be sent to office.

The Syrup and Brine Maker, to keep up the supply of these articles as the pack may demand, and record amounts of sugar, salt, etc., used daily.

The Sauce and Catsup Maker, also to be in charge of handling the tomato pulp.

It is, of course, understood that these helpers are not to confine themselves to the duties here outlined, but when not actively employed at their own proper tasks are to render assistance wherever their aid may be required.

PROCESSOR'S RECORD.

Processors should keep a temporary daily record of each kettle and batch on a slate or blackboard, with both "in" and "out" time, and transfer this temporary record each night to a permanent record written with ink. To avoid errors, frequently check the figured process times.

When several varieties or grades are being processed at the same time, attach metal markers plainly designating the contents, to each crate.

COOLING.

After crates are removed from process kettles, immediaetly drop them into a tank of running cold water to "kill" the live heat and prevent a secondary cooking, which injures color, flavor and appearance of goods. Cooling tanks may be constructed of any suitable material and of any desired shape. Long tanks through which the crates may be conveyed by means of an endless chain, or a simple round tank in which the crates may be dropped, or if not provided with suitable tanks, the crates may be set on the floor and the cold water applied by means of a hose. The method does not matter so long as the object is attained. The cans must not be allowed to remain in the water until entirely cold, but must be taken out after the temperature has fallen to from 120 to 140 degrees. This amount of heat will not injure the goods and will be sufficient to thoroughly dry the cans, thus freeing them from water that would be likely to cause more or less rust. If it is desirable or necessary, as in the

case of corn processed at 250 degrees, to cool off in the retort, introduce a water pipe at about the level of the upper blow-off in side of kettle, arranging a "spreader" to be put in place after crates are placed in retort. All goods will darken or scorch when processed at 250 degrees if removed from the retort and exposed to a direct current of air—particularly so in the case of corn, which must be cooled in the retort. When crates are removed from the cooling bath, allow time enough for every vestige of moisture to dry off before stacking the still warm cans in warehouse.

LACQUERING.

At this period, while the cans are still warm, is a good time for lacquering tops and bottoms. According to advice given previously, the cans should be placed in the process crates cap end up, and while the cans are still in the crate this end should be lacquered; then pile on floor in even rows, cap end down, and apply a coat of lacquer to the bottoms. Proceed in this manner until the day's output is piled up, and in such regular rows that each day's output may be correctly counted, which is a necessary feature in calculating the cost of packed goods. The cans must be perfectly dry before applying lacquer.

There are one or two very good Lacquering Machines now on the market. These machines handle the cans so well and so rapidly that they are an economical necessity. If present indications are borne out, the day is not far distant when all canned foods will be lacquered before leaving the factory. In the past lacquered cans have been under a ban, owing to unscrupulous parties taking old and damaged goods and lacquering them to conceal their real condition. The previous lacquering of all goods will prevent this imposition, keep such unscrupulous parties from hurting the entire canned food market, and reduce the amount of loss from swells and leaks due to rust. Cans containing such articles as baked beans, soups, puddings, etc., which are intended to be prepared for table use by heating in boiling water, should not be lacquered. The boiling water melts a portion of the lacquer, which adheres to the side of the kettle, and is to the disgust of the housewife, exceedingly difficult to remove. For this class of goods plain cans wrapped, instead of labeled, are preferable.

BOXING.

Cans are placed in the boxes or cases, two dozen to the case usually, with the exception of gallon cans, which are packed either six cans to the case or twelve. Some care should be exercised in this operation, as otherwise the labels will be marred or entirely torn from the cans.

Four nails in each end of the lid will hold it securely. When side-nailing cases, if this is considered necessary, drive nails where they will come between the rows of cans. Cases for export must be strapped with iron and double-nailed.

COMPUTING COSTS.

In computing the cost of goods packed, if but one variety is handled, it will be sufficient to calculate the various items to be considered once a week; if several varieties or grades are packed, it should be calculated daily. In the system employed by the power factory, a report must come from the Receiving Clerk stating the amount and cost of the raw material delivered to the peeling-room; from the Head Capper the amount of solder and flux used; from the Inspector the number and value of checks given out for piecework; from the Foreman and Forewoman the time and value of labor on each article packed; from the Superintendent the amount of labor not included in the above reports and an estimate of the amount of fuel used; from the Warehouseman the number, by actual count, of each variety, grade and size packed. The amounts covering coal, flux, solder, general labor not directly charged for otherwise, and also a small percentage to cover deficit in factory expense, implement, machinery and maintenance accounts are generally divided pro rata and charged to the various articles packed in making up the cost.

The following article on Cost is by Mr. J. W. McCall of the Gibson Canning Company:

The most essential thing in cost-finding to the packer is not to overlook any one item which enters into the cost of his product, and instead of satisfying himself with the "prime" or "factory" cost, he should determine the "cost to make and sell."

Most authorities on cost-finding divide the problem into three divisions, viz.:

1. Prime cost, or cost of all materials used, plus the direct labor.
2. Burden, oftimes called "general" or "overhead" expense.
3. Selling, or cost to market the product.

The subdivisions under the above heads are as follows:

MATERIAL COST.

1.
2.
3. Box
4. Cans
5. Caps
6. Solder
7. Sugar
8. Salt
9. Tomato sauce
10. Meat
11. Labels
12. Tissue
13. Direct labor
14.

BURDEN.

15. Salaries
16. Interest
17. Insurance
18. Taxes
19. Fuel, light and water
20. Maintenance
21. Sundry supplies
22. Sundry expenses
23. Indirect labor
24. Spoilage
25. Loss in accounts
26. Rents
27. Legal services
28. Depreciation
29. Storage

SELLING COST.

30. Brokerage
31. Traveling
32. Salaries
33. Advertising
34. Demonstrations
35. Samples
36. Discounts
37. Office supplies
38. Postage
39. Freight
40. Express
41. Telegraph and Telephone

PRIME COST.

Prime cost, or cost of all materials used plus the direct labor, is the first great factor in the cost of an article to the manufacturer, and great care should be exercised to see that each and every article of raw material used in a product is charged against it. While some of the items may appear small and of little consequence, you will find that in a pack there are a number of such items and in the aggregate the total is considerable

Every material entering into your production may be classed as raw material.

I think that special stress should be placed on the items of raw materials and that the packer should be impressed with the fact that the waste in raw materials is a very important factor in his prime cost, and frequently amounts to several cents per dozen on the cost of his product.

On account of this uncertain item of waste it is practically impossible for a packer to determine a close approximation of his cost except by closing his books once a year and determining the actual quantities of the raw materials bought and paid for and dividing the amount by the actual number of cases of goods packed and marketable to find the cost per case.

I think there is too much of a tendency among packers in their haphazard method of determining cost to base their raw material cost on some test runs whereby they find that a ton of corn will make 650 cans, for instance, and lose sight of the important fact that they annually pay for many tons of corn, as well as other vegetables or fruits, which never go into cans, but which are sorted out on account of being too mature or imperfect in other ways.

There is no fixed rule by which waste can be figured, as it depends almost entirely upon the caprices of the elements and the season. The waste on other items of raw material is worthy of consideration, while it is seldom as great as in the perishable fruits and vegetables; nevertheless, there are thousands of cans bought and paid for which are not used. They may have become jammed or perhaps rusted, or may have been rendered useless through some other cause. The same will apply to boxes, labels and almost every other article of raw material purchased by the packer.

Mr. Charles J. Watts, systematizer and factory cost accountant, says: "Cost on material may be subdivided as follows:

"Cost of Material: Material, freight, express, drayage.

"The elements of freight, express or drayage are constituents of cost of material. In figuring on material the cost at the factory is first taken; to it is added the laying down the material at your factory door. There may be either freight or express charges, and also drayage charges, at one or both ends of the line.

"Transportation charges of whatever kind on raw material should be so distributed as to be borne proportionately by material incurring the expense. If they are not, and freight, express and drayage are made general charges, an article may be put out bearing a disproportionate burden of such charges wrongly placed."

Transportation cost should be charged against each item of raw material as it is received. The can account should be charged with freight on cans, also with the expense of unloading and stacking the same. The same practice should be carried out with every other item of raw material received.

I recommend that every packer keep a stock book. In this stock book should be a debit record of all raw materials received at the factory, each character of material entered under its proper account. When supplies are drawn from stock to be used in the course of manufacture the stock accounts should be credited with the materials thus drawn, and the finished commodity account, for which the materials are used, should be charged therewith. This

not only is important in your cost accounting system, but the stock book is an up-to-date inventory of all raw materials and is invaluable as a reference to guide you in purchasing supplies.

Book accounts should be kept for each article of raw material which is used in any quantity. The corn packer should have an ear corn account, against which he should charge all of the corn bought from farmers. If he raises his own corn, he should charge the rent for the land on which the corn is grown against this account, likewise the team hire and other farm expense incident to growing and delivering the crop. He should charge his tomato account with all farm rents, expense, etc., incurred in growing and delivering tomatoes .and so on down the entire list of fruits or vegetables grown.

The packer who owns the land upon which he grows his canning crops should charge rent for the same against the proper account, just the same as though he had to pay the rent out to others, and the amount of rent thus charged should be based on the prevailing rates existing in that locality.

Such items as cans, boxes, labels, sugar, salt, solder and fuel should also have special ledger accounts.

For minor supplies, such as flux, sal ammoniac, lubricating oils, belts, hose, coppers, etc., etc., there should be a sundry supplies account, which properly comes under the head of burden and will be taken up later.

The second factor in prime cost is direct labor, sometimes termed productive labor, and is defined by Mr. C. E. Woods as "that labor employed in a plant whose efforts are directed solely to processing material into a product for sale.

"Non-productive or indirect labor is that labor which is employed in a plant whose efforts are not applied to the processing of material into a product for sale."

To further quote Mr. Woods: "This division should be strictly lived up to, for the reason that the opportunity for lessening costs on a given output requires exactly so much productive labor, and this cannot be varied except by a very small percentage. The amount of non-productive labor employed on a given output is, to a great extent, a question of administration and consequently is subject to a much greater percentage of varieties than is productive labor."

Direct labor is the one concerned in prime cost. Indirect labor is one of the subdivisions of burden, and will be taken up in its proper place.

Direct labor should be charged against the proper finished commodity account, and we recommend a system of timekeeping which records the actual amount of labor directed to each of the same. All labor directed to the production of canned corn should be charged against the canned corn account, and if a laborer's time is directed to several accounts during one day, such as corn and tomatoes, for instance, his time-card should show the number of hours chargeable to canned corn and the number of hours chargeable to canned tomatoes. This entails a little more work for the timekeeper, but it is of absolute necessity if an accurate cost accounting is to be made.

By the use of such time-cards your bookkeeper can segregate the items when making up the payroll and make the proper charges against each of the finished commodity accounts.

The more care you exercise in strict classifications of your payroll the more accurate will be your cost findings. It is desirable to have as little of the payroll as possible classified as indirect labor, as this is one of the subdivisions of burden, it must be spread over your entire output, and if you charge items to indirect labor that should properly be charged against some finished commodity account your ultimate cost findings will be incorrect.

BURDEN.

Burden is often referred to as "overhead' cost and is frequently considered as an indeterminable quantity and of only passing importance, but allow me to assure you that of the three divisions of cost it is the one which decides the success or failure of the manufacturers. It is like unto the stealthy assassin who sneaks upon a man in the prime of life and stabs him to the heart; thus the very life-blood of many an apparently successful business has eked away and left only a lifeless skeleton of what might have been a profitable enterprise.

We cannot urge too strongly that every member of this Association take proper cognizance of the importance of this item and bear in mind that it has just as much bearing on the cost of production as do cans, boxes or any other item.

No packer would presume to arrive at even an approximate cost of his product without taking into consideration the exact cost of his cans. It is obvious that the cost of any one item entering into the total cost of your product is just as important as any other item for the purpose of accurate cost-finding, therefore it is just as essential that you know your exact burden cost per dozen as it is to know the can cost per dozen, as you cannot determine the cost of your product without the consideration of both.

Burden is made up of a number of accounts which bear indirectly upon the article manufactured, and has nothing to do with the principal materials, direct labor or selling expense, and may be divided as follows:

15. Salaries
16. Interest
17. Insurance
18. Taxes
19. Fuel, light and water
20. Sundry supplies
21. Sundry expense
22. Indirect labor
23. Spoilage
24. Loss in accounts
25. Rents
26. Legal services
27. Depreciation
28. Storage

As before mentioned, the packer with one line can very easily charge all of these items against his one line, but when he packs, say, 50,000 cases of corn, 30,000 cases of tomatoes, 15,000 hominy and 10,000 pumpkin, how is he going to apportion it to make each line bear its proper share?

There is a tendency on the part of many packers to make their principal product stand the entire burden and not charge the proper amount against his so-called "side lines.' In this manner he overestimates the cost on the former and underestimates the cost on the latter.

We have striking evidence on this practice in the prevailing low price quoted on baked beans, pumpkin, lye hominy, etc. Usually these articles are packed as side lines, and the packer figures that he has his overhead expense or burden to carry anyway, and he therefore packs these side lines without considering this element of cost. This practice is manifestly incorrect and unfair, as each item packed should stand its just portion of the burden.

There have existed various methods of apportioning the burden in the various lines, but the percentage plan seems to be the one recognized as the most correct by cost accountants. Some authorities hold that burden should be apportioned on a pro rata basis and that it should be figured at so much per case and the same amount of burden charged against each case of goods packed, whether it be petit pois peas or standard lye hominy. Obviously, this system is incorrect, as the case of petit pois peas may represent three times the investment of the case of hominy. It is apparent that the actual cost of interest, insurance, spoilage, taxes, etc., is, say, three times as great on the petit pois peas as on the hominy. Therefore, the percentage plan is recognized as the most correct.

For the purpose of determining the per cent. of burden which is chargeable to each line let us first find the approximate value, at selling price of the year's output of each article packed; the ratio of the total value of each line to the grand total of the aggregate of all lines packed represents the per cent of burden chargeable to each line. For instance, a packer's yearly output is as follows, viz.:

10,000	Ex. peas at	$1.35	$27,000
20,000	Std. peas at	1.00	40,000
10,000	pumpkin at	.45	9,000
10,000	tomatoes at	.80	16,000
8,000	hominy at	.50	8,000
			$100,000

It is at once apparent that 27 per cent. of the burden is charged against ex. sftd. peas, 40 per cent. against standard peas, 9 per cent. against pumpkin, 16 per cent. against tomatoes and 8 per cent. against hominy.

Now, let us assume that the aggregate of all expenses which go to make up burden be $10,000; thus we find that the proportion chargeable to ex. sftd. peas is represented by 27 per cent. of $10,000, or $2,700, or 13½ cents per dozen cans for the 10,000 cases of extra sifted peas packed.

By carrying the figures out through the entire line we get the following burden charges per dozen for each line, viz.:

Ex. Sftd. Peas	27%	of	$10,000=$2,700÷20,000	doz.—	13½c. per doz.
Std. Peas	40%	of	10,000= 4,000÷40,000	doz.—	10c. per doz.
Pumpkin	9%	of	10,000= 900÷20,000	doz.—	4½c. per doz.
Tomatoes	16%	of	10,000= 1,600÷20,000	doz.—	8c. per doz.
Hominy	8%	of	10,000= 800÷16,000	doz.—	5c. per doz.

The amounts thus determined, plus the prime cost (material and direct labor) make what is called factory cost, and when the selling cost is added we have "the cost to make and sell," to which we must add our desired profit to arrive at our selling price.

We will take the different accounts of "burden" and treat them separately.

Salaries—To this account should be charged the salaries of all the executive officers, the superintendent, shipping clerk or any person or persons on salary whose attention is spread over the various lines.

Interest—This item requires no special comment.

Insurance—To include insurance of all kinds, such as fire, tornado, credit or accident.

Taxes—Here we have another item that is self-explanatory and might be charged in the sundry expense account rather than to open a special account for taxes, as the account would usually have only one or two entries a year and it is hardly worth while to give this item an account to itself.

Fuel, Light and Water—To this account should be charged all fuel used for power or heating, such as coal, wood and gasoline. All electric current for power or light should be charged to this account.

Maintenance—This account should properly be divided into two accounts. First, maintenance of buildings, and, second, maintenance of machinery. Against the former should be charged all bills for repairs on buildings, including labor thereon. Against maintenance of machinery should be charged all materials and work necessary to keep the machinery in proper working order, such as new steels for cappers, repairs for corn cutters or any other machines; also belting, lacings, sprocket chains, etc.

Sundry Supplies—This account should include such items as machine and engine oils, cotton waste, lamp globes, mittens, knives, baskets, flux, soldering coppers, rubber hose, and those many small articles which must be bought or replenished each year.

Sundry Expense—This account to include such items as telephone rent, express, freight and drayage charges on sundry supplies, traveling expenses to conventions, meetings, etc. It might also include taxes and legal services, as well as other items of expense which cannot properly be charged against the other accounts.

Indirect Labor—This is labor which is general in character and is not charged to any finished commodity. Night watchman, fireman, teamster, etc., etc., properly come under this head.

Spoilage—This item more appropriately might be charged directly against the account which is concerned—canned corn, peas, tomatoes or what not—and the result be more accurate than running it through the burden account.

Loss in Accounts—This is an item to be taken care of, and, while sometimes it is small, again it is a matter of great concern, and, we think, should be based on the averages in use by the credit indemnity insurance companies, which is one-sixth of 1 per cent. on the volume of business done, as this is the average percentage of losses on accounts covering a period of ten years.

Rents—This account will not include farm rents where it can be charged against a special account, such as corn, tomatoes, peas or any other vegetable grown on such rented land. It will include such rents as office, barn, factory, etc., etc., and if the packer does not have a great number of such rent items he might simplify matters by charging them to sundry expense

Legal Services—This item might better be charged against the sundry expense account, as very few packers employ enough "legal services" to render it advisable for a special account.

Depreciation—Depreciation has been defined as a lessening in value from age and contributory causes. In this account we have a very important one, and at the same time one which is overlooked by most packers. The longer a packer remains in the business, however, the more he is impressed with the fact that he must replace this machine or that; he must have it built over, or, in many instances, he must discard the machine entirely and replace it with something more modern. In many instances the machine thus discarded is not worn out, but, on the other hand, is in fairly good working condition, but improved methods have rendered it useless and the packer has been compelled to purchase a new machine of some character and the old one has been consigned to the junk pile; it is dead.

I recommend the following table of percentages for depreciation on buildings used for canning factories, viz.:

Brick, stone or cement building, slate or tin roof, cement or composition floors (where water is used), 3 per cent.

Brick, stone or cement buildings, shingle, gravel or composition roof, wood floors, 5 per cent.

Frame buildings, any character of roof, wood floors, 6 per cent.

Husking or other sheds, on brick, stone or cement foundations, 5 per cent.

As to the per cent. of depreciation on machinery I will say that it is a much more complicated proposition than depreciation on buildings, and depends largely on the care taken of it. We will each of us base our opinion on the life of a machine on our own experience with such, and at the same time there will be a great variance of opinions. For instance, you ask two farmers for their opinion on the life of a binder. The one who leaves his binder in the field, where he got through using it, and does not touch it again until the next harvest, will probably say from three to five years, while the farmer who takes his binder to his toolhouse when through with the season's work, cleans and oils it thoroughly and stores it in a dry place until the next harvest, will probably say from ten to twelve years. Likewise, there will be a variance in the opinions of packers relative to the life of canning machinery.

Tiffany gives the average life of a steam engine, properly set and under the exclusive charge of a competent engineer, 20 years; therefore the depreciation would be 5 per cent. A steam boiler, he claims, will not average more than 10 years, hence 10 per cent. depreciation would apply thereon.

The life of most special machinery in use by canners, we would say, will not exceed ten years, and while it is true that the depreciation on cast iron steam chests or retorts should not be placed so high, to offset this we have the machinery that has died on our hands after one to five years' use. So it appears to me that 10 per cent. depreciation on machinery should be charged off annually.

Now, to compensate for a portion of the depreciation thus charged off on both buildings and machinery, the item of maintenance, previously referred to, must be considered. The percentages of depreciation just given are based on the assumption that no money or work is spent on the buildings or machinery in the way of upkeep or repairs, but we are all aware of the fact that large sums are spent annually for this purpose, and such expenditures should be deducted from the depreciation charged off, as the buildings or machinery have been removed to the extent of maintenance.

Let us assume that the cost price of your buildings be $25,000, and that they are of that character of construction which places them in the 5 per cent. depreciation class; the amount to charge off would be $1,250, but we turn to our maintenance account and find that during the year we have put in a new floor at the cost of $500, window lights amounting to $10, have painted portions of the building, and have spent a total of, say, $1,000 on maintenance of buildings. This $1,000 should be deducted from the $1,250 depreciation, leaving only $250 net to be charged off. Let us go still further and assume that our maintenance account showed that we had spent $2,500 on repairs and betterments during the year. It is apparent that we have increased the value of our buildings in the sum of $2,500, less the annual depreciation of $1,250. An instance of this kind would, therefore, show a net increase in the building account of $1,250, making it $26,250 instead of the original $25,000.

The same practice should be followed in the depreciation of machinery. In this manner both items of depreciation and maintenance are fairly and equitably taken care of, and this plan meets with the approval of most cost authorities.

Storage—This is another of those items that may be charged against other accounts at times, as you will know whether your storage bill is for corn, peas or tomatoes, and it may be charged against the proper account at once.

Bear in mind that no charge should at any time be made against any of the accounts comprising burden, if it can be charged to any of the finished products accounts.

I cannot urge too strongly that every packer maintain an account for each of his finished products; for instance, canned corn, canned tomatoes, canned pumpkin, etc., etc., and that each such account be charged with those items which properly belong to it, and that when he closes his books at the end of his fiscal year, that he determine the proper burden and selling cost chargeable to each line, and that they be charged with it.

It is not necessary that every packer open the number of accounts under the same titles as I suggest, but I do hold that the principles outlined here are essential and correct.

I recommend that each packer who is not fully informed on his cost go into the matter very carefully with his bookkeeper and arrive at the cost of his product along the lines suggested before naming a selling price.

SELLING COST

I will now call your attention to a number of items which go to make up selling cost, which I have divided in the following heads:

Brokerage	Discounts
Traveling	Office supplies
Salaries	Postage
Advertising	Freight
Demonstrations	Express
Samples	Telegraph and telephone

Brokerage—This is an item which is very familiar to you all, as most of you sell your goods through brokers on a 2 to 3 per cent. commission basis. This means an added cost of 1½c. to 3c. per dozen, depending on the price that you get for your goods and the rate of brokerage which you pay. I will add right here, however, that the most economical method of marketing your product is through the brokers.

Traveling—This is an item of expense which may be large or small, depending on whether you have a number of traveling salesmen on the road or if you just call on your trade occasionally with a view of maintaining a personal acquaintance, or in placing your annual contracts. It is an item, however, that very few packers are able to eliminate entirely and frequently will amount to anywhere from 20c. to 40c. per case where the packer maintains a force of specialty salesmen who work the retail trade and turn their orders into the jobber.

Before any work of this kind is put into effect the packer should use every effort to post himself on the cost of specialty work, and this cost should be added to the price of his goods if he expects to remain in business.

Salaries—This pertains to salaries of persons engaged in the sales department only, whether it be for officials and clerks who solicit business direct from the office through correspondence, or salesmen on the road calling either on the wholesale or retail trade, or both.

Advertising—This is an item of sales expense which is becoming imperative if the manufacturer wishes to standardize his brands and create a demand for them, in a big way, at profitable prices, regardless of market conditions.

Demonstrations—This is an item of expense that will probably not interest a great number of the packers, as I am of the opinion that very few of them adopt this obsolete method of introducing goods today. It is a very expensive method and is not permanent in its results unless followed up by supplementary advertising.

Samples—This is an item of expense which is common to all packers, and the liberal way in which brokers call for them is prima facie evidence that they have large families; but, be this as it may, the matter of samples is a considerable item of expense, and to most packers amounts to several hundred cases of goods per annum. Do not overlook this item when you reckon your cost.

Discounts—This item, which I have put under the head of selling expense, doubtless should be more properly an item of burden and may be classed under either head, at the option of the packer; but, handle it as you may, it is an expense of several cents per case on your product and must be taken into account.

Office Supplies—This has reference to those office supplies used directly in the sales department, and this expense will depend upon the system in use in your office.

Postage—While this item is here considered under the head of sales, it is not, of course, all properly chargeable against this department, but such a large percentage of your postage is expended on letters relative to the sale and delivery of your goods that this is probably the most appropriate place to consider it.

Freight—The freight considered under this head is that which is paid for the delivery of your finished product when the same is not sold upon a factory basis.

Express—This item covers express charges on samples and advertising matter or any other express charges incidental to the sale of your goods.

Telegraph and Telephone—As most of the items of telegraph and telephone are bearing on the sale and delivery of goods, the expense of the same should be charged against sales.

In conclusion, I will say that the matter of cost-finding is not necessarily a complex or difficult one. Systems can be employed which go to the extreme in detail, and, on the other hand, very simple methods can be put into successful operation. Just remember that every dollar that you spend in business is an item of cost, whether it be a subscription to a Fourth of July celebration or in payment for a car of cans. The packer who considers all of these will not be far from right in the final analysis.

With these various data at hand, practically the exact cost of the goods as delivered to the warehouse may be had, and, while there is apparently quite a lot of labor and red tape involved, yet if faithfully and accurately conducted the results will fully justify any concern, large or small, in adopting such a system. It is quite possible that were the practice of ascertaining the cost daily more general, less canned foods would be marketed at the cost, or less than the cost, of the packing. The salary of the Superintendent may be included in the general labor account, but is usually considered office expense.

CONTRACTS.

For both tomato and corn packing it is necessary to be assured of a certain acreage of these products which will be sufficient, in normal seasons, to run the factory to its full capacity, and accordingly, even before the factory is an established fact, it is usual to make contracts with the growers for the acreage estimated to be required. The following typical forms for contracts may be used or so modified as to meet the conditions of your locality:

TOMATO GROWERS' CONTRACT.

(Make Out in Duplicate.)

No..... SMITHTOWN,.....19....

I, John Doe, hereby agree to devote the land and furnish everything necessary to plant and cultivate in proper manner..... acres of land in tomatoes, all to be planted with the variety of seeds furnished by The.....Canning Company, to be well set with plants as early in the season as weather conditions will permit and to keep them well tended and cultivated, and I agree to deliver all the products of the above specified acreage to The.....Canning Company at their factory in Smithtown....., in a sound and ripe

condition during the season of 19.... Tomatoes that are green on one side or not fully developed in size or color, or less than 2 inches in diameter, or bruised or jammed or overripe, will not be considered merchantable, and if not merchantable are subject to dock or refusal. I also agree, should I sell to any party or parties any tomatoes from this acreage without the written permission of The..... Canning Company, to forfeit to the said..... Canning Company the entire sum received from such sale or sales.

Tomatoes when ripe to be delivered to the factory in slat boxes or splint baskets. I furthermore agree that, should I fail, for any cause within my control to cultivate the number of acres specified, I will forfeit $..... per acre for such shortage.

The.....Canning Company agreeing that if they fail to receive all tomatoes above described when delivered during the days and hours named below, as fast as they can reasonably weigh and take care of them, they will pay me $..... for each acre on account of each failure, except as hereinafter provided. All tomatoes delivered at factory are to be left in the crates or baskets until emptied in their regular turn.

In consideration of compliance with above conditions, The.... Canning Company agrees to furnish all seed, free of charge, and to pay for the tomatoes $..... per ton of 2,000 lbs. delivered in the condition above mentioned at its factory in Smithtown,..... Settlement to be made on.....

Tomatoes to be delivered between the hours of 6 A. M. and 5 P. M. on each working day of the week except Saturday; no tomatoes to be delivered on Saturday without permission.

I hereby agree that in case of the destruction of the cannery by fire or by the elements, or if for any unavoidable cause the factory is unable to receive all the tomatoes grown, said factory shall have the right to limit the delivery of said acreage.

.....Grower.

Witness Accepted,

..... THE.....CANNING CO..

..... Per.....

CORN GROWERS' CONTRACT.

(Make Out in Duplicate.)

No..... SMITHTOWN,....., 19....

I, John Doe.....hereby agree to devote the land and furnish everything necessary, and to plant and cultivate in proper manner.....acres of sweet corn during season of 19.. Said land to be farmed in a thorough manner, cultivated and hoed all that is necessary to produce a good crop. Said corn to be delivered to The.....Canning Company's canning factory, under their direction, and weighed on their scales. Corn shall be free from any small nubbins, cobs with no corn on, corn too young to be used, or too ripe, or too long stems or stalks. Corn to be sown as per instructions to be given separate from this contract. The Sugar Corn shall be planted a sufficient distance from the common field corn to avoid mixture.

John Doe.....further agrees that in case he shall fail to deliver said corn within a reasonable time when notified by The..... Canning Company so to do, then this contract shall be null and void, and the said canning company shall not be obliged to receive or pay for said corn, and may reject all corn unfit for their use.

If the corn is damaged before delivery by the negligence of The Canning Company in failing to notify the grower in time, or from any negligence in running factory, then no discount shall be allowed to The.....Canning Company by reason thereof, except said loss shall be caused by conditions over which said company have no control.

The.....Canning Company agrees to pay..... DOLLARS per ton for the corn so raised and delivered. Settlements to be made in full on November 1st, 19...., and to furnish seed to plant above corn at cost, and give all necessary instructions about planting.

Six per cent. (or 120 pounds per ton) allowed grower for corn not in accordance with this contract, but in case percentage should be over six per cent., then dockage is to be calculated by this contract.

All corn will be tested at factory as unloaded, grower or growers having the privilege of testing their own corn if they so desire. Corn to be delivered same day it is pulled.

.....Grower.

Accepted,

THE CANNING CO.,

Witnesses: Per.....

.....

.....

TYPICAL CONTRACT FOR SALE OF "FUTURE" CANNED FOODS.

(Make Out in Duplicate.)

Office of SMITHTOWN,....., 19....

.....

.....

..... CANNING COMPANY.

Smithtown, ...

Sold to.....

.....

Through.....Broker.

.....Cases.....@.....per Doz.

..... "@..... "

..... "@..... "

..... "@..... "

F. O. B. Cars at.....

Terms Sixty Days' acceptance or cash, less 1½ per cent., if paid within ten days from date of invoice. Guaranteed against swells for six months from date of invoice.

Shipments to be made.....

In case of a partial failure of the crop we consent to the cutting down of this order twenty per cent. without liability for claim for damages and to accept a cash payment of fifteen cents per case for the cutting down of an additional twenty per cent. In case of the destruction of the cannery by the elements, the packer is not to be held liable for damages of non-delivery.

Remarks:

Accepted,

THE.....CANNING COMPANY,

Per.....

Buyer.....

No contract valid until accepted and signed by the Company.

NOTICE!

Before equipping your factory; before buying any kind of a supply; before employing a broker and before buying farming or any other machinery, seeds, etc., used in connection with the canning business, consult the advertisements at the back of this book.

If not found there, write us; we will cheerfully furnish a list of reliable parties, who will give you courteous treatment. Address "The Canning Trade," the canned food authority, Maryland Savings Bank Building, Baltimore, Md.

FOREMAN OR SUPERINTENDENT CONTRACT.

The following form of contract may be used to advantage:

.....19

It is hereby agreed between John Doe, of Doeville, ... and The.....Canning Company of Smithtown, ..., that the said John Doe is hereby engaged as Superintendent-Processor of their factory at Smithtown, ...for the season commencing.....19 and ending.....19

The said.....John Doe.....to have entire charge of the working of the factory, full command of all raw material from time received until packed and delivered to warehouse and absolute control of the employees necessary to perform this work. The said John Doe agrees to use his best knowledge, skill and endeavor to make a successful pack, and further agrees that if, at the expiration of six months from date of packing, the loss by swells amounts to more than 5 per cent., to forfeit a percentage of his salary equal to the percentage of such loss greater than the allowed 5 per cent.

In consideration, The.....Canning Company agree to pay the said.....John Doe.....the sum of $..... for this period in regular monthly installments of $..... each; and the said.....Canning Company further agree that all official orders and requests shall be delivered to the said John Doe.....through.....or, in case of his disability, through some other person duly appointed.

Signed.....ss

Witness ss

.....

.....

In this connection, it may be well to say that ALL inexperienced parties engaged in the canning business should secure at the start a thoroughly experienced superintendent-processor to have sole and entire charge of the fitting up of the establishment and directing the pack at least for the first season. When there are several members of a concern, requests or orders concerning work or methods should be officially conveyed to the superintendent-processor by one member only.

Observance of this rule will frequently prevent much friction and unpleasantness not only between the superintendent and the concern, but also between the members themselves.

VEGETABLES

The U. S. Food Standard is:

"Canned vegetables are sound, properly matured and prepared fresh vegetables, with or without salt, sterilized by heat, with or without previous cooking in vessels from which they take up no metallic substance, kept in suitable, clean, hermetically sealed containers, are sound and conform in name to the vegetables used in their preparation."

BLANCHING.

All green vegetables should be given a bath in running cold water for a sufficient length of time to make them plump and crisp. Blanching is simply the act of plunging the vegetables in a bath of boiling water which may or may not contain salt or other chemicals. The bath must be absolutely boiling when the article is dipped, and of such a capacity that the immersion will not more than momentarily check the boil. Blanching serves to set the color of green vegetables and also removes the mucilaginous substances, in which various germs find lodgment, from the surface. When chemicals are used in the blanching bath, they bleach, harden or toughen the surface according to the nature of the chemical used. The solvent power of pure water is sufficient to destroy the firmness, color and skin of many vegetables when cooked therein; this is why brine (the chemical action of salt is to harden water) is generally used to fill cans.

THE MAKING OF BRINES.

In preparing brine for canned vegetables there are but two elements to be regarded, as far as the materials that enter into the preparation of the brine are concerned. They are so familiar it is hardly necessary to mention them—water and salt. Yet many canners, by neglecting to give proper attention to the selection and preparation of these materials, have nullified the results of an otherwise careful process.

The water used in making brines should be soft; that is, not containing appreciable quantities of lime and free from iron. Whenever possible it should be obtained from wells and from springs, and if this is not possible filtration should be employed. In all cases careful tests should be made to determine the amount of impurities contained in the water, especial attention being given to the absence of iron and lime. Water which contains considerable quantities of iron is apt to cause trouble from discolored liquor where a heavy process is employed, as in the case of beans, corn and peas. This discoloration is caused by the sulphite of hydrogen liberated in the processing uniting with the iron in the brine to form a black liquid sulphide.

Not all instances of discoloration are due to the presence of iron in the brine, but the probabilities of discolored liquor and its consequences are so great where iron is present in the water that the greatest care should be taken to avoid such trouble. Iron is held in solution in the water by carbonic acid gas. This is a volatile gas, easily liberated by heat, precipitating the iron, which, being heavier than water, settles to the bottom of the brine. As a result brine drawn from the top of the tank may be free from iron, while that drawn from the bottom may cause serious trouble.

The presence of lime in the water used to make brines must be considered as equally deserving the attention of every painstaking canner. Nearly every packer knows the difficulty of obtaining the requisite tenderness in cooking vegetables which have shells such as corn, peas and beans when hard water is used. There is little question but that the presence of lime in the water used is responsible for this condition. Where the lime is present in small quantities no trouble is observed, but when present in considerable quantities it is precipitated in the cooking on the shells of the vegetables, forming the tough, insoluble covering canners are so anxious to avoid.

Water from different localities differs in degrees of hardness according to the locality and conditions governing. Water that may be perfectly satisfactory for washing and bleaching purposes will not do for process work unless treated. Where the lime is present as bicarbonates most of it can be driven off by heating and permitting it to stand, the lime precipitating with the heat and settling to the bottom of the tank, whence it is easily drawn off. This can be accomplished by heating with live steam or by means of a coil of steam pipes. This method of heating will also free the water from the presence of iron in the same way as it does the lime, by precipitation.

In ordinary cases some such method of treatment will be sufficient to reduce the lime and iron in the water below the danger mark and avoid the sources of trouble in the brine as far as the water is concerned. A greater degree of hardness must be treated by special methods.

The purity of the salt used in making brines is of equal importance. It is of little use to purify and filter the water used and then put right back into the brine through impure salt an equal or greater amount of foreign matter than has been removed in treating the water.

The principal impurities found in ordinary salt are the sulphates and chlorides of calcium and magnesium; sulphate of lime or gypsum is present in larger quantities. Where this impurity amounts to more than two per cent. the use of such salt should be avoided by all means, as the presence of lime in such quantities almost precludes the possibility of cooking the vegetables to the requisite tenderness.

While a salt which is over 98 per cent. sodium chloride cannot in itself be classed as unfit for canners' use, the presence of lime in the water used to make the brine, added to that contained in the salt, may result seriously in the finished product. Every canner should submit to a reputable chemist a sample of the salt he intends using in his season's pack, absolutely rejecting any brand that falls below 98 per cent. pure salt. To be safe rather than sorry a packer should not use a salt which tests under 99 per cent. Such a salt cannot contain excessive amounts of lime.

There is no reason why any packer should take chances with ordinary salt. There are a number of brands of salt on the market which conform to the canners' requirements, and will give him ample returns in the way of satisfactory output. It pays always to use the best.

For the reasons above given it seems as though the preparation of a pure brine must be considered one of the most important steps in the canning business. The danger of a discolored liquor, toughened shells and unsatisfactory flavor resulting from the presence of iron and lime in the brine either from the salt or the water can be avoided. A little care will secure pure water, and the same attention given the salt question will reap satisfactory rewards in improved product.

MAKING BRINE.

For making brine jacketed copper kettles, wooden tanks with closed copper coils in bottom, or wooden tanks with steam jet, may be used. If a steam jet is employed, carry a copper pipe with an L on end to bottom of tank and direct to opposite side. In making brine, first bring the water to a violent boil, then add the sugar, salt, etc., and stir until dissolved. If the steam jet is used, little or no stirring is required. Guard the bottom outlet of tank with a strainer to retain chips and particles of paper which may be in the sugar and salt. If the material used contains much dirt or specks place it in a closely-woven bag and suspend just below the surface of the boiling water.

By dissolving the amount of salt specified in the first column of the following table in 12½ gals. water, the percentage of salt contained in the resulting solution will approximate:

1 oz.....	1-16th	of 1	per cent. or	.000625
2 oz.....	⅛	of 1	per cent. or	.00125
4 oz.....	¼	of 1	per cent. or	.0025
8 oz.....	½	of 1	per cent. or	.005
1 lb.....	1		per cent. or	.01
2½ lb.....	1½		per cent. or	.015
2 lb.....	2		per cent. or	.02
3 lb.....	3		per cent. or	.03

ASPARAGUS, NO. 1 PROCESS.

Wash free from adhering earth and give bath in cold water until crisp. Scrape off the tough outer skin and roughly assort according to diameter of stalks. Cut off butt, leaving top of right length for can. Wash thoroughly in cold water; place carefully, butts down, in a wire basket provided with a cover to keep stalks in place. Have ready a boiling hot bath containing ½ lb. salt to 12½ gals. water; immerse the grass for 1-3 its length and boil from three to five minutes, according to thickness of stalks, then drop so that 2-3 is covered, and cook from three to five minutes.

Then drop in cold water for the longest convenient period; place carefully in cans and fill with cold brine (2½ lbs. salt to 12½ gals. water), solder lid and exhaust:

Two-lb. cans, 8 minutes; 3-lb. cans, 10 minutes, and 4-lb. cans, 12 minutes. Tip and process at 240 degrees 2-lb. cans, 10 minutes; 3-lb cans, 12 minutes; 4-lb. cans, 15 minutes, and at 212 degrees, 2-lb. cans, 40 minutes; 3-lb. cans, 45 minutes, and 4-lb. cans, 50 minutes.

Remove from process kettle and drop in cooling bath. For glass jars, fill with cold brine and allow same process without exhausting.

ASPARAGUS, NO. 2 PROCESS.

Wash, scrape, sort and size. Blanch two minutes in bath containing salt ½ lb., water 12½ gals. Place in side opening cans, fill with brine (2½ lbs. salt to 12½ gals. water), solder lids and exhaust.

Two-lb. cans, 8 minutes; 3-lb. cans, 10 minutes; 4-lb. cans, 12 minutes. Tip and process at 240 degrees, 2-lb. cans, 25 minutes, 3-lb. cans 30 minutes, and 4-lb. cans, 35 minutes.

Drop in cooling bath. This is the time for stalks of average thickness; for small size allow three minutes less; for large, three to five minutes more.

ASPARAGUS TIPS, WHITE.

Cut tips from stalk, place in cold water to crisp, blanch two minutes in bath containing salt ½ lb., water 12½ gals. Drop in cold water for the longest convenient period; fill in cans, hot dip in brine (2½ lbs. salt to 12½ gals. water).

Cap, tip and process at 240 degrees, 1-lb. cans, 8 minutes; 2-lb. cans, 10 minutes; 3-lb. cans, 12 minutes, 212 degrees, 1-lb. cans 35 minutes; 2-lb. cans, 40 minutes; 3-lb. cans, 45 minutes.

Drop in cooling bath.

ASPARAGUS TIPS, GREEN.

Cut tips from stalk, place in cold water to crisp, blanch two bath containing ½ lb. salt to 12½ gals. water. Place in cans, hot dip and process same as white tips.

ASPARAGUS PULP FOR SOUP.

After washing the stalks left in preparing white tips, place in a jacketed kettle, cover with cold water, bring to a boil and cook twenty minutes; then add ½ lb. salt for each 12½ gals. contained in kettle and cook ten minutes longer, drain off water, reserving a small portion, and run the grass through a rotary pulper. To the resulting pulp add enough of the reserved water in which it was cooked to make it handle easily; while still hot fill in one-gal. cans, cap, tip and process twenty minutes at 240 degrees or forty minutes at 212 degrees.

PROCESSED BEANS.

(Formerly known as "Baked.")

Beans are classed among the winter packed goods ,and their handling is not easy. Like many other articles, they turn out very poor unless they are well packed. It might truly be said there is no room for a poor quality of baked beans. Unless the packer makes up his mind to put up a standard or better grade of beans he had better not touch them, for he is almost certain to lose money. There are goods in the canner's line that it pays to pack as seconds, because there is a certain demand which cannot be supplied by standards because of the prices, but not so with baked beans. The old condition of cheap dried beans and their preparation in every kitchen still holds, and seconds or worse than seconds, in the generally accepted terms and understanding of seconds, will not overcome the condition.

PROCESSED BEANS WITH PORK.

Select and clean pea beans of recent growth, place two bushels in a fifty-gal. bbl. and nearly fill with a solution of 2 lbs. salt in 12½ gals. water; soak 12 hours, then drain off surplus liquid.

Old beans will require a soak of 18 to 24 hours, and usually an increase in process time.

If the cost of the finished product will allow, place one bushel of beans in a 50-gal. bbl., nearly fill with brine and soak 4 to 8 hours. then drain off and replace with fresh brine and soak 4 to 8 hours; draw off this brine and cover beans with fresh water, soak 4 hours and drain. This removes much of the rank flavor and improves the

finished goods. Slice salt pork (bellies) thinly and place in bottom of cans; ¼ oz. in No. 1 cans, ⅜ oz. in No. 2 cans, ½ oz. in No. 3 cans; then fill cans ⅞ full of the soaked beans and hot dip in—

2½ lbs. Salt.
3 lbs. Sugar.
½ lb. Ground White Pepper.
½ pint Caramel (burnt sugar coloring).
12½ gals. Water.

Cap, tip and process at 240 degrees, No. 1 cans 2 hours; No. 2 cans 2½ hours; No. 3 cans 3 hours. With Chloride Calcium bath (234 degrees), allow ½ hour more. With open bath (212 degrees), allow double the time.

If a thick sauce is desired, thicken with 2½ to 3½ lbs. Corn Starch.

PROCESSED BEANS WITH PORK AND TOMATO SAUCE.

Soak the beans as before directed; after draining off the surplus liquid, add to each 100 gals. of the soaked beans 10 gals. of the following sauce:—

30 gals. Tomato Pulp.
10 gals. Water.
20 lbs. Sugar.
6 lbs. Salt.
10 oz. Ground Yellow Mustard.
12 oz. Ground White Pepper.
1 lb. Powdered Tartaric Acid.
½ pint Caramel Color.
2 oz. Ground Saigon Cinnamon.

Any grade of tomato pulp as prepared for making catsup may be used, but canned stock made by boiling down entire tomatoes is preferable.

Place the pulp and water in kettle, bring to a boil and dissolve the sugar and salt, then add the other ingredients and mix.

After placing the pork in cans, fill seven-eighths full of the mixed beans and sauce. If, after processing, it is found that the sauce does not properly adhere to the beans, thicken the sauce with 2 to 5 lbs. of corn starch.

PROCESSED BEANS WITH PORK AND TOMATO SAUCE, FANCY GRADE.

Soak the beans in salted and freshen with several changes of pure water. Substitute concentrated tomato juice for the tomato pulp and water in the sauce.

BAKED BEANS WITH PORK AND TOMATO SAUCE, EXTRA FANCY GRADE.

Soak and freshen the beans, drain off water, place in jacketed kettle and cover with cold water, bring to a boil, then reduce to a gentle simmer and cook until the skin will crack by blowing on them when held in the hand. Drain off the water, reserving a portion of it for use; place the beans in iron pots of 2 gals. capacity and provided with tightly fitting covers; add one pound of butter and enough of the water in which the beans were cooked to just cover the beans; place cover on pot and bake 2 hours in a suitable oven. Remove beans from the pots and mix with a fair proportion of the following sauce:—

10 gals. Canned Pulp from Entire Tomatoes.
10 gals. Concentrated Tomato Juice.
15 lbs. Sugar.
4 lbs. Salt
8 oz. Ground White Pepper.
1 oz. Ground Saigon Cinnamon.
4 oz. Worcestershire Sauce (L. & P.).

In the meantime, prepare the pork by covering with cold water in a kettle, bring to a boil and cook slowly 2 hours. Strain and clarify the grease which separates in cooking the pork. It may be used in enriching bean soup or the poorer grades of baked beans. Cut pork in suitable slices, place in cans and fill nearly full with the prepared beans. Cap, tip and process at 240 degrees, No. 1 cans, 30 minutes; No. 2 cans, 45 minutes; No. 3 cans, 60 minutes; at 234 degrees, No. 1 cans, 35 minutes; No. 2 cans, 50 minutes; No. 3 cans, 65 minutes; at 212 degrees, No. 1 cans, 60 minutes; No. 2 cans, 90 minutes; No. 3 cans, 120 minutes.

BAKED BEANS IN INDIVIDUAL POTS.

Soak the beans as directed for plain pork and beans; drain off the salt water, and cover with cold water; add the desired amount of salt pork cut in chunks of one pound or less; bring to a boil, then simmer until beans are thoroughly cooked and soft; remove the pork and cut in small, thin slices; drain the water from the beans, reserving a portion, which thicken with corn starch, or with beans from which the skin has been removed by rubbing through a sieve; to each gallon of this thickened water add 1 lb. of salt, 2 oz. ground white pepper. Mix sufficient of this sauce with the cooked beans to make a mass of the desired consistency; fill the pots half full, then, add a slice of pork and finish filling the pots with beans. Moisten the surface slightly with a solution of 1 lb. of sugar in 2 pints of water, then brown top by passing through a gas oven arranged with overhead burners.

The above formula is used only for restaurant service or such immediate uses, and even then a certain amount of preservative is used in the preparation, so as to insure a longer keeping period, and, of course, the formula is subject to such variations as may be desired, with or without pork, or corned beef, with tomato sauce, etc.

LIMA BEANS.

There are several methods of packing Lima beans: one in their fresh or natural state, another in the dried, or what is known as "soaked" or "winter packed," and a third way in connection with corn, this last being known as "succotash." We will treat first the Lima bean in its natural or green state, in which it makes the most presentable article, the one which brings the best price in the market.

These goods are in general demand, and are mainly packed in No. 2 cans. They are not particular to any section, though California and Michigan may lay claim to being the greatest bean-producing States in the Union. There is no doubt that they do turn out the bulk of dried beans, supplying almost the entire market.

But Lima beans suitable for canning are grown in every section of the country, though special arrangements will have to be made by canners with the growers, as the usual limited amounts grown on the farms cannot be depended on for a pack of any size.

The Standard of the Baltimore Canned Goods Exchange reads: "Cans full of green beans, clear liquor."

Shell and clean the beans by hand; separate into two sizes with rotary sieves; spread out on table and pick out yellow and imperfect beans; crisp in cold water; blanch in boiling water two minutes: place in cans; fill with hot 2½ per cent. brine: cap, tip and process.

Small Beans, No. 1 Cans, 30 minutes at 240 degrees.
Small Beans, No. 2 Cans, 35 minutes at 240 degrees.
Large Beans, No. 2 Cans, 40 minutes at 240 degrees.

LIMA BEANS, YELLOW (DRIED).

Shell and clean the beans; blanch 5 minutes in a 1 per cent. solution of salt water; pick out imperfect beans, fill into cans and fill with the following syrup:

2½ lbs. Salt,	Cap, tip and process No. 2 Cans 45
12½ gals. Water.	minutes at 240 degrees.

If preferred in their liquid, use same brine as for green Limas.

RED KIDNEY BEANS.

Soak the beans in cold water 12 hours, drain off water, place on sorting table and pick out all split beans and those with ruptured skins; fill cans about seven-eighths full and fill with boiling hot syrup made as follows:—

12½ gals. Cold Water.
3 lbs. Salt.
4 lbs. Corn Starch.

Place the salt and 10 gals. water in kettle and bring to a boil; mix the remainder of the water with the corn starch; add to the boiling salt solution, stirring vigorously, and bring to a full boil.

Can, tip and process, No. 2 cans 2½ hours at 212 degrees or 75 minutes at 240 degrees; No. 3 cans 3 hours at 212 degrees or 90 minutes at 240 degrees.

STRING BEANS.

The smaller the beans are the finer the article they will make, because they are tender and nearly free from the tough string, from which they take their name, and which forms as the bean grows. The beans are also then of a fine color, being the rich dark green so desirable. The finest beans are picked when only about two inches long and about ⅛ of an inch thick; and for this reason, of course, a large quantity is required. From this size up they will grade according to the time picked.

After being picked, they should be brought to the factory with as little delay as possible, and care should be given that they are placed in splint baskets or slatted crates, never in bags. The reason for this, as is well known, is that when packed in bags they sweat and become tough, losing their crisp, brittle nature. If the beans become wilted, they should be placed in fresh, cold water, allowing them to stand for a time, which will largely restore their crispness.

Wash them in cold water to remove all grit and string carefully from both ends; then break or cut into pieces one inch or 1½ inches long. The smallest sizes are packed whole.

In the last few years there have been put on the market a number of very useful machines for grading the beans into the various sizes, for cutting them to any desired length and for filling them into the cans.

The Standard of the Canned Goods Exchange calls for: "Cans full; beans young and tender and carefully strung, packed during the growing season."

After properly preparing them, blanch two minutes in boiling water; place in cans, fill with hot 1½ per cent. brine, cap, tip and process for the usual, average size beans:

No. 2 Cans, 40 minutes at 240 degrees, or 60 minutes at 212 degrees. The smaller sizes require less time, dependent upon their tenderness.

GREEN STRING BEANS, FANCY GRADE.

Select very small, young and tender beans, as stated above. Wash and crisp thoroughly in cold water; string very carefully from both ends, using the thumb nail instead of a knife to start; place carefully in cans without breaking; fill with hot 1½ per cent. brine, cap, tip and process.

No. 2 Cans, 30 minutes at 240 degrees, or 45 minutes at 212 degrees.

STRING BEANS, WAX.

These are handled and processed the same as green string beans. Care, however, must be taken to remove all the specked or discolored beans.

BEETS.

The inside enameled can, made on the sanitary system, has been proven very efficient in holding the color of beets, and other red fruits and vegetables, indefinitely.

Beets, especially those grown with fertilizers containing an excess of nitrogenous matter, frequently undergo a chemical change after being packed for a few weeks, the natural color bleaching to a sickly yellow. An artificial color added to the syrup will not prevent this; it simply seems to make the beets present a more unsightly appearance. The addition of 4 oz. Bicarb Soda to each 12½ gals. water, used in the preliminary cooking, appear to retard or correct this in many instances.

Allow the leaf stems to remain during the preliminary cooking, as it prevents the bleeding and loss of much of the natural beet color; they also serve as a handle while trimming and skinning.

BEETS, BLOOD, EXTRA GRADE.

Select small garden beets, the largest not more than 1¾ in. in diameter, wash thoroughly to remove all adhering soil, cut top off at base of leaf, place in wire baskets and steam at 214 degrees for 12 minutes, or boil in water for 15 minutes; drop in cold water, then shave off rootlets; skin and cut off tops close; place in cans, hot dip in syrup (sugar 2 lbs., salt 2½ lbs., water 12½ gals.). Cap, tip and process No. 3 cans 30 minutes at 240 degrees, or 50 minutes at 212 degrees.

BEETS, BLOOD, STANDARDS.

Handle large beets in the same manner, but allow more time for the preliminary cooking. The beets should be about three-quarters done before trimming and skinning. If there is a great variation in the size, sort roughly before cooking. After cooking, halve or quarter, if necessary, pack in cans and hot dip in brine (salt 2½ lbs., water 12½ gals.). Cap, tip and process same time as small ones.

BRUSSELS SPROUTS.

Pick off all dead leaves, wash well in cold water, blanch 3 minutes in boiling hot bath containing salt 1½ lbs., Bicarb. Soda ¼ lb., water 12½ gals.; place in cans, hot dip in brine (salt 1½ lbs., water 12½ gals.), cap, tip and process No. 2 cans 12 minutes at 240 degrees, 35 minutes at 212 degrees; No. 3 cans 15 minutes at 240 degrees, 45 minutes at 212 degrees.

BOILED CABBAGE.

Clean off all outside green leaves, cut in quarters and remove all core and if the cabbage is very large and coarse the large midribs. Wash thoroughly in cold water, keeping a sharp look out for worms. Blanch the cleaned cabbage in boiling water until it is thoroughly wilted, say 10 to 15 minutes, or place in cages in a retort and give 5 minutes at 240 degrees. Pack tightly in cans soon as cool enough to handle, fill with hot 3 per cent. brine and process.

No. 3 cans, 45 minutes at 240 degrees; No. 10 cans, 90 minutes at 240 degrees.

CAULIFLOWER.

Pick off outer leaves and cut stalk close to head, break apart and crisp in cold water; blanch 3 minutes in bath containing salt 1½ lbs., water 12½ gals., place in cans, fill with hot brine (salt 1½ lbs., water 12½ gals.). Cap, tip and process.

No. 2 cans 12 minutes at 240 degrees, 35 minutes at 212 degrees; No. 3 cans 15 minutes at 240 degrees, 45 minutes at 212 degrees.

CELERY, FOR SALADS, ETC.

Select fine white celery, cut off roots, all green portions and leaves, crisp in cold water, cut in pieces ¼ to ⅜ of an inch long, place in glass jars and fill with hot syrup (1 gal. 60-grain vinegar. 2 gals. water); close jars and sterilize pints one hour at 190 degrees.

CELERY.

Cut cleaned Celery, also the green and unsightly portions of that left in preparing Celery for Salads, in pieces ¾ to 1 inch long. crisp in cold water, place in cans and hot dip in brine (salt 1 lb., water 12½ gals.), cap, tip and process at 240 degrees, No. 2 cans 12 minutes, No. 3 cans 15 minutes; at 212 degrees. No. 2 cans 35 minutes, No. 3 cans 45 minutes.

CELERY PULP FOR SOUP.

Wash white celery thoroughly, cut in pieces and place with the trimmed roots in jacketed kettle, cover with cold water, bring to a boil and cook 30 minutes or until tender, drain off the water, reserving a portion of it. Pass the celery through a rotary pulper, mix the resulting pulp with enough of the reserved water to make it handle easily; place while hot in No. 10 cans, cap, tip and process 30 minutes at 240 degrees.

CORN.

While the packing of corn occupies the second place of importance in the list of canned articles, it is difficult, owing to the greatly varying conditions existing in the different sections, and the variety of machines and systems employed in its packing, to do more than give an outline of such process as may be generally adopted.

And let us here again remind our readers that none of the times of process given in this Course should be used on an entire pack of any article without first giving them a thorough testing on a small batch of the goods to be packed. The reason for this primary testing is that the conditions in any section of the country are liable to vary somewhat from other sections, and, in fact, are almost certain to do so, owing to a difference in altitude, a difference in the water, a difference in the soil or fertilizers used and various other causes which directly affect the fruit or vegetable grown in that section. These differences are shown in the goods after being packed, and, to counteract them, the treatment must be slightly changed, as may be required. *It is absolutely impossible to set down one fixed time on any article for all sections and conditions, and this must be borne in mind.* We give in this Course such time as is in most general use, as it were the basis of action, to be changed slightly one way or the other as occasion demands. It is always understood that common sense and good judgment must be added to all working formulæ.

Under any and all conditions, corn requires careful handling to produce a fine article, and the season, whether it be wet or dry, the soil and the treatment of the growing crop will be found to have had an effect upon the green corn, which must be counted upon in the process-room. For good corn there is always a good market, and a relatively poor market for a poor article.

The great corn-packing sections are Maine, New York, Maryland, the northern and western part of the State, and Iowa; and following these, Illinois, Ohio, Michigan, Indiana and in the past few years Minnesota and Wisconsin have been producing some very fine corn. With the exception of the Southern States and California, nearly every State in which the canning industry is conducted finds some corn packed.

To make a financial success of packing sugar corn, it is necessary that the canning factory should control a large enough acreage to warrant the installation of the latest and best machinery. This line of machinery has advanced probably further toward perfection than any single line of machinery connected with the canning industry, and is today practically automatic in its action. Hence, it goes without saying the production of a factory is immensely increased by its use, while, at the same time, the quality of the product is improved. This is the great consideration in this article, and, in fact, has resulted in almost the entire disappearance of the hand-packing corn cannery.

Factory Arrangement.

If corn alone is to be packed the plant should be placed in a three-story building and so arranged that one machine will discharge directly into the following machine. In the power factory the filling and capping line is necessarily placed on one floor and occupies the space formerly occupied by the pineapple machinery.

There is a great variety of arrangements of the factory for packing corn, probably as many as there are corn-canning plants, but the idea to be kept in view in all cases is to have the corn come to the factory and pass through the entire treatment, until it comes out in the sealed can, with as little confusion as possible and no double handling. When the active packing season comes on everything must be handled quickly, for the season is short and corn must not be allowed to stand, and for this purpose everything must be in exact order before the season opens.

Simply summing up what has been said, to pack corn successfully, it is necessary to have a large acreage of sugar corn contracted for; the factory should be equipped with modern corn-canning machinery, and great care must be exercised in packing that a first-class article may be packed.

The growing corn should be closely watched, and when at the desired stage of development should be pulled in the early morning, even when it is not desired to deliver to the factory until late in the day. When it can be possibly avoided, carry no corn over until the next day; if unavoidable, spread it out in such a way that air will have free access to it.

When received at the factory, husk the corn and separate the defective ears; trim and cut out worm-eaten places and remove all black and discolored spots; run through brushing machine to remove as much silk as possible, then through washing machine, then through cutting machine; then through silker, then into the mixer, where add the desired amount of syrup or "brine;" then into the cooker, where the temperature should be raised to 175 degrees. When starting the filler after a shut-down, return the first few cans to the cooker. Corn must go into cans at a temperature as near 170 degrees as possible; if filled at a higher temperature, the cans will be slack when cold; if at a lower temperature, the process time must be increased. When work is once started, the operations should be continuous; it is especially necessary that it be kept constantly moving from the time it is placed in the cooker until it reaches the retort. After processing, cut cans frequently to detect darkening, slack or overfilled cans. At the end of the day's work, clean all machines thoroughly, removing every particle of corn and gummy matter, using a liberal quantity of hot water in which sal soda has been dissolved.

In some sections corn appears to keep perfectly when processed at 240 degrees, but, as complications are constantly arising, which would have been prevented had a greater heat been used, it is advised that not less than 250 degrees be employed in any section. When processed at this temperature the corn will darken if cans are removed immediately after the process and exposed to the air; consequently, it must be partly cooled in the retort with water.

For processing corn the Automatic Calcium System, to some minds, possesses some advantages over retorts, owing to the constantly changing position of the cans and their contents.

Corn Standards as adopted by Ohio and Indiana Canners' Associations:

Fancy—Cans to be well filled; minimum gross wt., 23 oz.; absolutely young and tender stock; natural color; medium, moist and practically free from silk, cob and husk.

Standard—Cans well filled; minimum wt., 23 oz. gross; stock reasonably tender; free from hard particles; natural color.

Indiana has only the Standard, no Fancy; and says "packed medium moist" instead of "free from hard particles."

Number of Cans Per Ton—On the average 500 cans per ton, up to 25 cases (600 cans), 3 tons to acre on land that will yield 50 bu. of field corn.

CORN, DRY PACK OR MAINE STYLE.

Set the machine to cut off about one-third of the grain and to scrape the remainder; pass through the silker; place in mixer and add enough syrup (Sugar, 6 lbs.; Salt, 5 lbs.; Water, 25 gals.) to give it the desired consistency; then cook and fill, cap, tip and process No. 2 cans 1 hour at 250 degrees. Cool cans in retort.

CORN, FANCY.

Use a double-cut corn cutting machine or after corn comes from the silker, subject it to the action of a recutter, then pack and process same as above; the consistency, however, being heavier as a rule, and the corn more tender, due to careful selection before cutting.

CREAM OF CORN.

Score every grain of corn and scrape out the pulp, run through the silker, place in mixer and add sufficient syrup (Sugar, 7 lbs.: Salt, 6 lbs.; Water, 25 gals.); handle and process same as above.

CORN, FRANCO-AMERICAN STYLE.

Prepare same as cream of corn using same syrup. While in the mixer add for each gallon of corn pulp ¼ oz. ground white pepper and ½ pound melted butter. Cool and process same as above.

CORN, WET PACK OR MARYLAND STYLE.

Cut the entire grain from the cob, which must be done by hand; remove all silk, place in can and hot dip in syrup (Sugar, 6 lbs.; Salt, 5 lbs.; Water, 25 gals.), cap, tip and process No. 2 Cans 50 minutes at 250 degrees. Cool in retort. If cans are filled with cold syrup, cap and exhaust No. 2 Cans 10 minutes at 212 degrees, tip and process 45 minutes at 250 degrees.

DANDELION GREENS.

Gather the leaves before the plant blossoms, wash well and crisp in cold water; blanch 3 minutes in boiling water, place in cans, and hot dip in brine (salt, 1½ lbs.; water, 12½ gals.). Cap, tip and process at 240 degrees, No. 2 cans 30 minutes, No. 3 cans 40 minutes; at 212 degrees, No. 2 cans 60 minutes, No. 3 cans 75 minutes.

ENDIVE.

Handle and process same as dandelion.

HOMINY.

Hominy is gaining in the extent of its pack from year to year, but it is not likely to assume great proportions because of its nature. There is much trouble attendant upon its packing, and the profits are relatively small; so that hominy lacks the inducement some other articles offer.

Lye Hominy Standards, as adopted by Indiana Canners' Association:

No. 3 Standard—Minimum gross wt., 39 oz. and 18 oz. hominy after draining; can filled to one inch of top when drained. Prepared from medium-sized white corn, and to contain not more than 5 per cent. of black tips.

No. 3 Fancy—Minimum wt., after draining, 22 oz.; contents ½ inch from top of can; 2 per cent. black tips; prepared from selected white corn.

HOMINY WITH TOMATO SAUCE.

Place two bushels half-grain hominy in a 50-gal. barrel, then nearly fill with a solution of Bicarb. Soda, 1 oz. in 12½ gals. water; soak 12 hours, then drain off surplus liquid. Place the hominy in a tank fitted with a closed coil, cover with cold water, bring to a boil and simmer, without stirring, 5 hours, or until the hominy is soft; drain off the surplus water and to each 100 lbs. add 2 gals. of the following sauce:

30 gals. Tomato Pulp.
10 gals. Water (in which hominy was cooked).
6 lbs. Salt.
12 oz. Ground White Pepper.

Place in cans while hot, cap, tip and process, No. 3 cans 90 minutes at 240, or 2½ hours at 212 degrees.

HOMINY, PLAIN.

Treat and cook as for Hominy with Tomato Sauce, except that barely sufficient water is used to cover it, and it is stirred frequently while cooking; when the hominy is soft and the water has assumed a creamy consistency, add 1 lb. of salt and 1 oz. ground white pepper to each 100 lbs. Place in cans while hot, cap, tip and process same as above.

HOMINY AND SAUSAGE.

Treat and cook as for hominy plain; prepare the sausage, which should be of the small "Frankfurter" size, in the same way as used with sauerkraut, first boiling it, and place several in each can.

KALE.

Wash well in cold water to free from sand and dirt, pick out all dead leaves, blanch in boiling water 5 minutes, chop fine, fill in cans and hot dip in brine (salt 2 lbs., water 12½ gals.). Cap, tip and process No. 3 cans 20 minutes at 240 degrees.

MUSHROOMS.

Have the mushrooms as freshly gathered as possible and of even size, wash to free from dirt, peel and throw in bath containing 1½ oz. Sulphite of Soda and 12½ gals. water. Blanch 3 to 4 minutes in a bath of water 12½ gals., salt 5 lbs., Citric Acid 1 oz.; place in cans, hot dip in brine (salt 2 lbs., water 12½ gals.). Cap, tip and process at 240 degrees, No. 1 cans 10 minutes, No. 2 cans 12 minutes.

OKRA.

This article is somewhat extensively packed for soup purposes, but is one of the articles in cans which should have a much larger demand. If it were properly put before the consuming public, there can be no doubt that its sale would be greatly increased, because it is in large request among housekeepers.

Okra can be easily grown and could be canned and placed upon the market at a figure which would bring it within the reach of all, and yet show a neat profit to the packer.

THE FORMULA.

Wash the okra in cold water, blanch 20 minutes in boiling water, cut in transverse slices, rejecting the hard ones and the tough stem end, place in cans, fill with cold brine (salt 2½ lbs., water 12½ gals.). Cap, exhaust No. 2 cans 10 minutes at 212 degrees; No. 3 cans 15 minutes at 212 degrees. Tip and process No. 2 cans 25 minutes at 240 degrees: No. 3 cans 35 minutes at 240 degrees.

OKRA AND TOMATOES.

Wash, blanch and cut the okra, place the prepared okra in a jacketed kettle and mix with them an equal bulk of peeled and cored tomatoes, turn on steam, bring to a boil and cook 15 minutes; place in cans, cap, tip and process No. 2 cans 15 minutes at 240 degrees; No. 3 cans 20 minutes at 240 degrees.

PEAS.

In peas we have one of the most important packs of the industry, it being classed among the "staple articles." While this is the case, however, this article cannot be grown and packed with success in every section of the country, for it will be found that not every section turns out a quality of pea which will pack well, and this has caused the packing of this article to be largely confined to certain sections. Experience has taught the growers and packers of these sections that Nature is kind to the pea there, and that when properly handled in the packing house a fine article can be produced.

The mechanical inventions have possibly been more noted in connection with this article and of more benefit to it than in any other single article connected with the business, and they have all tended to not only increase the output, with a saving in time and labor, but to increase the quality of the goods. This is so true that it is now recognized that without these improved mechanical devices it is impossible to pack peas profitably.

Having acquainted himself with all the requirements of this pack and equipped his factory in such manner as to be able to handle the crop rapidly and thoroughly, the packer may consider himself ready, though the first year's pack may be expected to fall below his expectations.

Pea Standards as adopted by Ohio and Indiana Canners' Associations:

Fancy—Well-filled cans; peas covered with clear liquor; uniform size, good flavor and absolutely tender.

Extra Standard—Well-filled cans; peas covered with clear liquor; uniform size; good appearance; reasonably tender.

Standard—Cans fairly well filled; peas may be slightly hard; fair liquor, may be slightly cloudy, but not thick; size fairly uniform.

Grading for size—Petit Pois or size No. 1, sieve 18-64th; extra sifted or size No. 2, sieve 20-64th; sifted or size No. 3, sieve 22-64th; June or size No. 4, sieve 24-64th; Marrowfat or size No. 5, sieve 26-64ths.

Peas are not among the easy goods to process and keep, but among the most difficult so far as turning out a uniform product with clear liquor is concerned. Not only do the peas of one year's growth differ from another, but they also vary considerably during the same season, so that frequent cutting of processed cans and close and constant inspection of each step in the various operations is necessary that the processor may be guided in changing the filling of cans and the process time to produce a pack of uniform quality and appearance.

The process times given here are a fair average, but the processor should bear in mind that peas grown during a wet season will require a shorter process than those grown during a dry season, also,

as a rule, the later in the season the peas are planted, the more process they require. The processor should aim to turn out a finished article that is fit for table use by simply heating through, to contain no broken or bursted peas and with a perfectly clear liquor. In filling cans, more young peas than old will be required; if cans are filled too full, some of the peas will burst and produce cloudy liquor. For filling cans use a 3 per cent. brine, though by many sweet brine (3 per cent. salt, 2 per cent. sugar) is considered an improvement on plain brine. If peas are picked at the proper time, brought promptly to the factory and then speedily and properly handled, the natural color of all the better grades will be quite sufficient to satisfy the sensible consumer.

Other conditions being equal, it is claimed that the "viner" system produces a finished article that is rather superior to those packed in the ordinary way. In common with most vegetables, peas are much improved by crisping in cold water, and even peas which are badly wilted will turn out of fair quality if given a long bath in cold water and the blanching time slightly increased.

The packing of peas, except on such a small scale as has no commercial significance, is confined to power factories, and, while the vining machine has practically displaced the old hulling machine in many sections where peas are drilled and harvested much the same as wheat, it is rather a question if the old and new methods combined will not give better general results.

Following this plan, we install in our factory a pea huller, and outside, opposite the cleaner, under a temporary shed a viner to be run by an independent engine. A traction or portable engine will prove economical and efficient for this purpose. Place the huller in blocks bounded by 1 to 5 and 61 to 64; the cleaner in numbers 5 to 8 and 65 to 68; the separator in 9 to 12 and 69 to 72; the washer in 79 to 103 and 75 to 99, and the blancher in 84 to 108 and 80 to 104. Then place the picking tables in numbers 110 to 122 and 115 to 127, and the filler in 117 to 119 and 165 to 167, delivering directly to steam exhaust box in 168. After the shelled peas come from the huller or viner, run through the cleaner, which removes all the dust and pieces of stems, etc.; then through the separator, which divides the peas into uniform sizes; then each size must be run through the washer which should empty into the blancher, which, in turn, empties onto the picking tables, where the women remove all the broken peas, the black eyes or yellow peas, the thistles, etc., as the peas move before them on the rubber belts. These tables empty into large buckets, which are picked up and emptied into the hoppers of the fillers. Here the cans are filled and brined automatically, passing into the exhaust box before going to the capper.

Exhaust the filled cans in steam box, bringing the temperature to as near 170 degrees as possible. Cap, tip and process No. 2 cans:

No. 1 size or Petit Pois,	15 minutes at 240 degrees.
No. 2 size or Extra Early June,	16 minutes at 240 degrees.
No. 3 size or Early June,	20 minutes at 240 degrees.
No. 4 size or Sifted June,	25 minutes at 240 degrees.
No. 5 size or Sifted Garden,	28 minutes at 240 degrees.
No. 5 size or Marrowfats,	30 minutes at 240 degrees.

Sizes No. 1 and No. 2 can stand a longer process without being damaged, and there are those who advocate a reversal of the above times on that account, giving the short time to the large peas and the longer time to the small peas; but in general we advocate the above times, with such variations as local or peculiar conditions may make necessary.

Peas are nearly always packed in No. 2 cans.

PEA SOUP STOCK.

The yellows and black eyes may be utilized for soup. Cook soft in jacketed kettle, pass through pulping machine and make immediately into soup or pack in gallon cans for that purpose—fill in the cans hot, cap, tip and process 45 minutes at 240 degrees.

Off peas may also be dried and afterward ground into pea meal. This article is largely used on shipboard and in public institutions for soupmaking. Cut the pods and vines and store in silos for feeding stock.

When a plant is intended for packing peas and corn exclusively, a three-story building should be erected, arranging the various machines so that one will discharge into the other.

THE CANNING OF PEAS

Based on Factory Inspection and Experimental Data.

BY

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Historical Note.—According to the early accounts of the art of canning, peas were among the first vegetables to be preserved in this manner, and later they were among the first to enter the canned foods trade. Pea canning may be said, therefore, to be as old as the canning industry. At first the process was used only to preserve such choice fruits and vegetables as were most difficult to keep in the fresh state, as the cost of glass bottles and earthenware jars prevented their use for cheaper products. After the invention of the tin can, as the cost was lessened, peas became one of the most important articles packed. The pea-canning industry began in this country in Baltimore during the Fifties. There was an immediate demand for the product, and consequently some packing was done at nearly every factory. The peas were grown garden fashion and picked and podded by hand; but the labor required was so great that the output was small and the price high. The methods used did not differ in any essential detail from those followed in preparing fresh peas in the kitchen. The demand continued to increase, but the total output of all the early factories would not equal that of one small modern plant.

The first labor-saving device of importance in pea canning was the podding machine invented by Madame Faure in France in 1883. This machine was described in La Nature, Paris, April, 1885, and a translation, with illustrations, appeared in the Scientific American June 6, 1885. The invention was practically duplicated in this country in 1889. By means of the podding machine one person could do the work of a hundred or more in removing the peas from the pods, thus making possible the canning of much greater quantities. The American podding machine was improved and in 1893 it was patented as a vining machine. After this invention it was no longer necessary to pick the pods from the vines in the field; the plants could be mowed, hauled in by wagon, and the peas separated from the pod and vine at one operation. The whole pea-canning industry was changed by this invention. Practically all of the peas canned in this country are passed through these vining machines, so that their use has virtually changed the growing of peas in small patches—market-garden fashion, with hundreds of persons going over the vines and picking the pods—to the cultivating of large fields which are cut by a machine. The viner occupies the same relation to hand picking in the pea-canning industry that the thrashing machine does to the flail in the thrashing of wheat.

Pea canning is one of the most important lines of the canning industry, being third in order of output, tomatoes and corn, being, respectively, first and second, although peas are second in point of value. The pea pack for 1907 is estimated at 6,505,961 cases, valued at $14,650,000, the largest amount ever packed in one season.

THE PEA.

Origin and Characteristics.

The pea belongs to the Leguminosæ, an order of plants which is of great economical value, as many of its members yield foods, drugs, dyes and valuable woods. Chief among their products are peas, beans, lentils, peanuts, tamarinds, licorice, senna, gum tragacanth, gum arabic, logwood, indigo, rosewood, locust and Brazil wood.

The origin of the pea is unknown, but it is supposed to have been carried to Europe by the Aryans at a remote period. The field pea, Pisum arvense, is found wild in Italy, but the garden pea, Pisum sativum, grows only under cultivation, so far as known. In Queen Elizabeth's time peas were occasionally brought from Holland and considered "a dainty dish for ladies; they came so far and cost so dear." The taste for green peas became fashionable after the Restoration in 1660, and their culture was given much attention, later becoming so general as to be one of the most important field crops. Garden peas were considered a delicacy, and the French gave considerable attention to their culture and canning, and through selection they developed varieties yielding tender small peas of fine flavor. The pea was brought to North America by European colonists, and grown in kitchen and market gardens.

Food Values.

Of all the vegetables known the legumes are the richest in respect to their nitrogenous content, Knight going so far as to claim that they will be found equal to meat in nutritive powers for active open-air workers. Statements of this nature are not true of green peas, but apply to the mature seeds only. The following analyses show the results obtained on the mature peas, and also on the green pea before and after canning:

Results of analyses of peas.

Analyst.	Water.	Protein.	Fat.	Starch, etc.	Cellulose.	Ash.
Dried Peas.						
	Per Ct.	Per Ct.	Per Ct.	Per Ct.	Per Ct.	Per Ct.
Abel*a*	9.50	24.60	1.00	62.00		2.00
Church*b*	14.30	22.40	2.50	51.30	6.50	3.00
Knight*c*	14.31	22.63	1.72	53.24	5.45	2.65
Payne*d*	8.30	23.80	2.10	58.70	3.50	2.10
Wiley*e*	12.62	27.04	1.58	51.75	3.90	3.11
Green Peas.						
Abel	74.60	7.00	.50	*f*16.90		1.00
Wiley	79.93	3.87	.49	13.30	1.63	.78
Canned Peas.						
Abel	85.30	3.60	0.20	*f*9.80		1.10
Wiley	85.47	3.57	.21	7.79	1.18	1.11

*a*Abs. Friedenwald and Ruhrah, Diet in Health and Disease, p. 91, 1905.
*b*Food, p. 83, 1887.
*c*Food and its Functions, 1895.
*d*Abs. Pavy, F. W., Food and Dietetics, p. 167, 1881.
*e*Foods and Their Adulteration, pp. 288, 313, 1907.
*f*Including cellulose.

According to these figures, the average amount of protein in the dry peas is 24.09 per cent., indicating that the canned peas lost some protein during the preliminary treatment. Leach states that 2.03 per cent of the

protein of the pea is soluble in water, and 10 per cent. is salt solution. These figures were evidently for the mature pea. Church states that the predominating protein in leguminous plants appears to be more soluble and more easily digested in the green than in the mature seed. In the preparation of peas for canning, they pass through a washer, where they are sprinkled with cold water, and then go to the picking tables, still wet, and after this into the blancher containing hot water. The length of time that the peas are in the washer varies in the factories, while the time they remain in the blancher depends upon the grade and size of the peas, varying from one to twelve minutes. After leaving the blanchers, the peas are placed in the cans as quickly as the machines will work, and the brine is filled in at the same time. From the treatment it is apparent that the peas may lose some protein before entering the cans, and that more may dissolve in the brine after they are in the cans. A part of the loss of protein in canning is, however, more apparent than real, as the peas take up in blanching and processing, thus increasing their total weight, which only seemingly reduces the proportion of protein.

The liquor from peas which had been canned in water, and also liquor from peas canned in brine, were tested for protein. While the reactions with the water extract indicated distinct traces of protein, those with the brine were much more pronounced. Some of the canners advise the use of the original pea liquor in the preparation of the peas for the table, supposedly with the object of utilizing the extracted foods. Usually the liquor is discarded as being somewhat objectionable in order.

Geographical Distribution.

While the growing of peas is not limited to any one particular part of the United States, they are grown with the greatest success where the spring is a little slow in changing from cool to warm weather. The northeastern and north central parts of the country grow most of the peas, Wisconsin leading in their production, closely followed by New York. These two States produce almost one-half of the entire pea pack of the country. Indiana, Michigan, Maryland, Illinois, New Jersey, Delaware, Ohio, California, Pennsylvania, Iowa, Minnesota, Virginia and Kansas follow in order. Peas are also being packed in Colorado, Idaho, Utah, and Oregon, but they cannot be grown in the Southern States nor in many places in the Central and Western States in competition with those grown near the Lakes, as the period of harvesting is too brief and other hazards of the crop are too great. Pea packing is rapidly increasing in Wisconsin and Michigan, because of favorable climatic conditions for production.

PRODUCTION OF PEAS ESPECIALLY FOR CANNING.

It is said that the different seed firms list about 300 varieties of garden peas, or at least give that many names. The varieties used by most canners are Alaska and Little Gem for the early or smooth varieties, and Horsford's Market-Garden, Admirals, and Advancers for the late or wrinkled varieties. The smooth varieties are not as sweet as the wrinkled.

It would seem as though much improvement might be made in peas through breeding and selection for increased sugar content, fine texture, pleasing flavors, and smaller peas. These are qualities especially sought by the trade. To simulate a greater sugar content, sugar is added to the liquor, but the other requirements can only be obtained by proper growth. The possibility of developing a plant with greater resistance to climate changes, especially heat, and of lengthening the season of development are also worthy of special study.

TIME AND MANNER OF HARVESTING

In Indiana, Illinois, Ohio, and States of similar climatic conditions the period of harvesting for the factory is less than twenty days, and seed will

not mature to advantage on account of weevils. In Michigan and Wisconsin the harvest period is from six to eight weeks, and the seed readily matures. Ninety per cent. of all the pea seed for planting is produced in northern Michigan. The irrigation system in Colorado and Utah have opened up possibilities in pea growing, the extent of which is not known at this time.

The average dates for harvesting peas for a series of years.

State.	Date.	State.	Date
California	May 20 to June 20	New York	June 15 to Aug. 1
Colorado	June 15 to Aug. 15	Ohio	June 1 to July 10
Delaware	May 25 to June 30	Oregon	June 10 to July 30
Illinois	June 10 to July 14	Pennsylvania	June 1 to July 1
Indiana	June 5 to July 10	Utah	June 10 to July 15
Maryland	May 25 to July 1	Virginia	May 20 to June 10
Michigan	June 15 to Aug. 10	Wisconsin	June 15 to Aug. 10
New Jersey	June 1 to July 3		

A longer harvesting period in the Northern States is possible because successive plantings can be made of the same varieties as well as of early and late varieties. In the more southern areas the crops are too liable to mature at one time—late-sown peas as early as the first sown—thereby overcrowding the factory.

Peas were formerly gathered by hand. Five pods usually form upon each vine, and the lowest is only about 10 inches above the ground. This part of the work was, therefore, very slow and laborious, and requires an amount of help available to but few factories. At present there is only one large factory known to the writer employing hand labor in the picking of the peas. It requires about two thousand pickers to keep a large factory in operation, and adds a cost of about 1.5 to 2 cents to each can.

The method in general use is to cut the vines with a mowing machine, or, if any are exceptionally erect, to use the self-rake reaper. If the mowing machine be used, then it must be followed immediately by men with forks to bunch the peas in order to prevent trampling by the horses, and to put them in condition for easy loading. Within the past year or two special attachments have been devised to be connected to the mowing machine for the purpose of bunching and delivering to one side. The cutting is usually done early in the morning, and only such part of the field is cut as can be delivered promptly to the viner. The object is to prevent any heating of the vines or any drying. The vines are loaded upon wagons, like hay, and hauled to the vining machines.

Grading and Valuation of Crop.

The basis on which peas are paid for varies greatly at the different factories. Many pay a flat price, so much per bushel or hundred pounds of shelled peas. When this plan is pursued it is advantageous to the factory to insist on the peas being delivered as young as it is possible to use them in order to get the maximum amount of small peas, but it is to the farmer's advantage to delay hauling them in order to get an increase in growth and weight. Such a method is not fair to either factory or producer, neither is it fair to the different producers, one with a first-class load and another with an over-ripe load.

A second method is to have a scale of prices for two or three grades of peas. The rating of any given load is made by an expert and is a matter of judgment. The appearance of the vines, the size of the peas, the hardness to the sense of touch when squeezed between the fingers, and sometimes the taste are the factors which guide in the decision. Such a method is manifestly better than a flat rate of so much per bushel, but it is not nearly so accurate as could be desired and is also subject to personal bias.

A third method is to pay two or more prices, according to the percentage of peas of a given size. A half-gallon measure of peas is taken out of a given load and poured into a box having a bottom perforated with No. 3 holes. If, as the result of shaking, one-half or more of the peas pass through the sieve and they are fairly soft the second price is paid; if the peas be overripe or hard the lowest price is paid. This method is used by a number of factories and, although not perfect, is an improvement over the other two.

A fourth method is to take a sample from each load during the thrashing and run it through the grader. The sample usually weighs 10 pounds, and the screens in the grader corresponds to those used in the factory. The weights of the five grades are taken separately and the price is established upon the percentage of the different sizes of peas. Some factories modify this procedure slightly by rating Nos. 1 and 2 together and Nos. 4 and 5 together, thus making three grades in size as the basis for payment. The greater the percentage of the smaller sizes of peas, the higher the price paid for a bushel. This method seems the fairest of those now in general use.

The fifth method for payment is based upon quality, rather than upon size, as in three of the methods described, in which it is assumed that small size is associated with immaturity and tenderness, an assumption which is not always in accordance with facts. Large peas may be as soft and tender as the small ones, and small peas may be as hard as those that are overripe. This method consists in taking a few vines as a sample from each load, shelling the peas and placing them in a cylinder which has a perforated bottom and is suspended in a salt solution. If the peas are young and tender a large percentage will float in a weak brine. If they are older or second grade they will sink in a light solution, but will float in a heavier one. If old, hard or overripe they will sink in the heavier solution. The density of these solutions is varied within narrow limits for the early and late varieties of peas, and is discussed in more detail under grading in the factory.

This method is expeditious, and experience has shown that it is as nearly accurate in practice as the fourth method of grading based on size. The ideal grading system should be based on a combination of size and weight.

FACTORY OPERATIONS.

Vining or Thrashing.

The separation of the peas from the pods and vines is accomplished by a single operation. The viner is an ingenious though simple piece of mechanism, consisting of an outer cylinder having perforations of such size that peas will pass readily through, but which will retain the pods and vines, and an inner cylinder upon which there are paddles or beaters. The outer cylinder is made to revolve slowly in one direction, and the inner one at a high rate of speed in the opposite direction. The vines are fed in at one end of the cylinder and are carried up by the slower-moving outer cylinder until they fall off, and in so doing strike the paddles upon the rapidly revolving inner cylinder. The impact of the paddle causes the pod to break open and the peas to be thrown out. The process is repeated again and again as the vines work from one end of the cylinder to the other. The peas are discharged through the perforations of the outer cylinder and the vines at the opposite end. The work is done thoroughly and the peas are not bruised or crushed by the operation, as might be expected. As a further aid in separating the smaller bits of stems, leaves, etc., the peas fall from the cylinder upon a moving web placed at such an angle that the peas will readily roll down into the receiver, while the flat leaves and other particles which will not roll will be carried off.

The vining machines are supplied to the different factories upon a royalty basis, the charge being 3 cents per dozen cans for all shelled peas put up at the

factory. These machines are large and, as a rule, are set in batteries at the factory instead of being taken to the fields. A few of the very large factories have established vining stations at varying distances from the factory and bring in the shelled peas by wagon, automobile, or rail. This practice requires rapid handling, as the peas will heat much more quickly after than before being shelled. A large saving in the hauling of vines is effected, and the injury to the peas is probably not greater than would occur in letting the vines wait. These viners were formerly fed by hand, but recently a mechanical feeder has been devised, so that the vines are pitched off the load and the machine completes the work. An automatic weighing device has also been added to take the place of the pea collector and weigher, and conveyors are used to carry all vines to the stack or silos so that the actual hand work is reduced to a minimum.

Shelled peas which are hauled to the factory must be kept in thin layers rather than in bulk. The best carrier seems to be a box about 6 inches deep, having a raised wire bottom made like that of a berry box. The layer of peas is only about 4 inches thick and is well ventilated. The boxes or crates, no matter how constructed, must be sterilized with steam and rinsed with scalding water each day or they will become infected with germs which will cause spoilage.

Washing.

The first operation through which the peas pass after being weighed from the viner is that of washing. This is accomplished in what is known as the squirrel cage, which is a wire cylinder about 3 feet in diameter and 12 feet long. The cylinder is set on a slight incline so that when the peas are admitted at one end they will tend to roll to the other as the cylinder revolves. On the inside is a perforated pipe that sprays a stream of water upon the peas, which insures their being well washed provided the spray has some force. When the weather is very warm and the peas accumulate more rapidly than they can be passed through the filler, it may be necessary to wash the shelled peas in cold water every few hours in order to prevent fermentation. The washing should be thorough, not only to remove all dirt, but also the mucous substance, thus insuring a clearer liquor.

Grading for Quality.

After the peas pass through the washer, they should be graded according to the degree of maturity or hardness. This is accomplished by passing them through tanks containing salt solutions of different densities. It has been found that the young, tender peas will float in a salt solution somewhat heavier than water, and those more mature will sink, while the very mature peas will sink in a heavy salt solution. Peas, therefore, may be sorted very readily into different grades according to their density by using different strengths of salt water. In practice three grades have been made. The first grade consists of all peas which will float in a solution having a specific gravity of 1.040. The second grade consists of those peas which will sink in a solution of this density but which will float in a solution having a specific gravity of 1.070. The third consists of the peas which will sink in the latter solution. A machine has been devised to remove the peas from the top and bottom of these solutions so that their separation is automatic and continuous.

The principle involved in the separation of peas into grades for quality is not new, having long been applied to the selection of seeds. It was tried for grading peas for several years without success, because solutions having the proper density were not obtained and the necessary working apparatus was not available. On May 27, 1894, a patent was granted on a device for grading peas, which has since been improved so as to work very well.

The grading of peas for quality is as sharp and clear as that for size. The lightest weight peas are the finest, being even in quality, succulent, and

tender. The heaviest peas are the poorest, being uneven in quality, hard, overripe, and of bad color. The middle-weight peas are good, but harder than the first grade, of darker color, and not so uniform. These differences are most apparent before the canning is done, though they are readily distinguishable in the can, and also show on chemical examination.

In any load of peas there must be some plants more mature than others, and as a consequence, some hard peas will be mixed with the tender ones. Every effort is made to cut the peas at nearly the same state of maturity, but no field will ripen perfectly evenly. If the peas be produced by a hundred farmers, the differences will be accentuated. In localities where the peas mature slowly, the differences will be less marked than where they mature rapidly. Under any conditions there will be some differences in quality, and under unfavorable conditions the percentage of poor peas may be very high. Separation for quality is so well effected by the specific gravity grader that it undoubtedly will receive a recognition equal to that given the sizing machine.

According to an Indiana factory, in which the quality system of grading has been developed, peas rated good and poor upon the wagon gave the following results after passing through the grader.

Quality grading compared with wagon tests.

Grade.	Rated good on wagon.	Rated poor on wagon.
1906.	*Per cent.*	*Per cent.*
First	60.60	40.20
Second	20.75	20.59
Third	18.65	39.21
1907.		
First	51.10	26.35
Second	28 85	37.76
Third	20.05	35.89
1908*a*.		
First	28.85	
Second	43.34	
Third	30.81	

*a*Whole crop rated by grader in this year.

Had the specific-gravity system not been in use the output of first-class peas would have been much smaller and that of second and third grades correspondingly increased. The trade permits a small percentage of hard and off-size peas in the first grade, but with this system these "off" peas are very few. The characteristics of the different grades will be considered again under the finished product.

A chemical examination of peas graded for quality as well as for size results as shown in the following table:

Chemical examination of peas graded for size and quality.

(Analysis made in the Division of Foods, Bureau of Chemistry.)

Grade	Total solids.	Ash.	Crude protein	Crude fibre.	Pento-sans.	Starch	Sucrose	Reducing Sugar	Undeter-mined
Petit pois:									
First	14.23	1.03	3.44	1.68	0.75	5.57	0.72	0.00	1.04
Second	18.80	1.78	4.19	1.84	0.92	8.53	0.93	0.00	0.61
Third	18.44	1.82	4.41	2.28	0.94	8.53	0.817	0.00	0.357
Sifted:									
First	22.06	1.36	5.31	2.21	0.96	10.23	0.987	0.00	1.012
Second	24.32	1.04	5.69	2.05	1.01	11 52	0.57	0.00	2.44
Third	27.74	1.37	5.63	2.18	1.50	13.52	0.48	0.00	3.06
Marrowfat:									
First	22.22	1.02	5.13	2.18	0.98	10.48	0.94	0.00	1.49
Second	24.10	1.30	6.69	2.55	1.55	8.77	0.636	0.00	2.604
Third	27.15	2.03	5.94	2.00	1.27	12.91	0.361	0.00	2.639

The table shows more total solids and higher protein and starch content in the third grade goods. This might be expected, as the third grade represents the more mature product. If canned peas were purchased for their nutritive properties only, then the third grade would be the preferable one to buy, but they are usually selected for their delicacy and flavor, which are found in the highest degree in the youngest and tenderest peas, or the first grade.

Grading for Size.

The grading for size is a very simple matter. The peas are passed over sieves, or into a revolving cylinder having four sections with perforations of different sizes. The perforations in the first sieve or section measure nine thirty-seconds of an inch in diameter. The peas which pass through this size opening are known as No. 1, or "petits pois." The next size of perforation is ten thirty-seconds of an inch in diameter, and the peas passing through are known as No. 2 'extra sifted," or 'extra fine." The third size of perforation is eleven thirty-seconds of an inch, and the peas which pass through are known as No. 3 "sifted or fins." The last size is twelve thirty-seconds of an inch, and the peas which pass through are known as No. 4, or "early June" peas. The peas which are too large to pass through this sieve go over the end and are known as No. 5, or "marrowfats." Some packers add one more sieve for late peas, with perforations thirteen thirty-seconds of an inch in diameter for the No. 5, and those which pass over this sieve are called No. 6, or "telephone peas." The sizes of these perforations are standard and in general use. Some packers have attempted to make sizes of their own by reaming out the holes, while others do not use all four sieves, but group two sizes together; and some peas are ungraded.

These sizes are so nearly standard for all pea packing that they should be adhered to in the labeling. The term "early June" peas as now used applies to a certain size and not to the season at which the peas are picked, and the size larger, or "marrowfat," should not be labeled "early June." "Extra early June" or "May pickings" is not a proper designation for sifted peas. It is evident that the standard terms used to designate size should be employed in labeling if the proper meaning is to be conveyed to the purchaser. Commercially, almost any size of pea may be found to be selling as "early June" in the

cheaper grades. The more expensive peas are usually sold true to name, though it is not unusual to get smaller peas in the high grades than is indicated upon the label. The terms "early June," "May pickings," "extra early June," and others of that character could be advantageously supplanted by names more distinctive of size, as the present terms conflict with the requirements of the food and drugs act as to labeling, unless the product be actually packed at the time indicated.

The percentage of peas which go into the different sizes will vary considerably with the time of harvesting, the variety, and the season. One of the large factories furnishes the following figures upon the crops for 1906 and 1907:

Percentage of different sizes in the crops for two years.

Size.	1906.	1907.
	Per cent.	*Per cent.*
1. Petits pois	4.00	7.60
2. Extra sifted	7.50	12.20
3. Sifted	30.30	34.70
4. Early June	50.20	28.10
5. Marrowfat	8.00	17.40

It is not known how these figures will compare with the grading for the entire country, as this is a matter which canners do not make public.

Hand Picking.

After the peas have been graded into sizes they are usually run in thin layers over slowly moving belts, so that pieces of foreign material, broken, fully matured, and defective peas may be seen easily and removed. Low-grade peas are not so carefully picked over.

In the section of the country where Canada thistles are abundant, their separation is a difficult problem, as the thistle top is about the same size as the pea, and only the very large ones are removed by the graders. During the last season experiments were made in removing the thistle tops by the specific gravity system, and it was found that more than 90 per cent. of them would float in a light brine (having a density of 1.020), while only a small percentage of the peas floated in such a solution. It is evident, therefore, that instead of employing hundreds of girls to perform this work, more than 90 per cent. of the tops could be collected in less than 10 per cent. of the peas. The reduction of the tedious hand labor by such a method is apparent. These tests were made too near the close of the season to be completed, but sufficient work was done to demonstrate the correctness of the principle. The work can also be very materially reduced by separating the thistles from the vines at the vining machine.

Blanching.

There are two objects in blanching peas: (1) To remove the mucous substance from the outside and a part of the green coloring matter, so as to have a clear liquor in the can; and (2) to drive water into the peas so that all will be tender.

In the young, juicy pea, the water content is at its maximum, so that the cleaning of the surface is all that is necessary. The time required for blanching is from one-half to one minute for No. 1 and No. 2, or "petits pois" and "extra sifted;" one and a half minutes for No. 3, or "sifted;' two minutes for No. 4, or "early June;" and two and one-half minutes for No. 5, or "marrowfat" peas. To get the best results, peas which are old and hard will need

a blanch approximately five times as long as young peas of the corresponding grade, while those in the intermediate stages will require a blanch proportional to their development.

It is evident, therefore, that among peas that are good, but ungraded as to quality, there will be a greater or less number which will be hard because of under blanching, and some above size because of swelling during the blanching and after processing. There is no part of the work of canning peas which requires so much judgment as that of blanching if the best quality of goods is to be obtained. Much of the very cheap goods upon the market are made so because of following "rule of thumb" methods in this department. The division of peas into grades for quality as well as for size will simplify somewhat the problem as to the length of time that blanching should be continued, but not to the point of making the position of blancher one of secondary importance in the canning factory.

Experiments were made to determine the effect of varying periods of blanching on the different sizes and grades of peas, and the influence exerted on swelling, tenderness, color of the liquor and fill of the can. While the primary object was to determine the relation of blanching to spoilage, the secondary effect on the commercial grading was evident.

Young peas will stand either a long or short blanch better than old ones. The effect upon the increase in size was determined by running the peas over the same size screens before and after blanching, and noting the percentage which did not pass through. It was found that after a ten-minute blanch the percentage which showed an increase in size was as follows:

Percentage of peas increased in size by blanching for ten minutes.

Size of peas	Grade 1.	Grade 2.	Grade 3.
	Per cent.	*Per cent.*	*Per cent.*
Petits pois	28	45	82
Sifted	26	42	56
Marrowfat	24	42	68

The increase in size was much greater in grades 2 and 3 than in grade 1. The experiments with the one minute blanch and the five minute blanch were not made upon complete sets, but the results obtained indicated a similar change, though it was less marked.

The peas were filled into the can so as to give a uniform weight, and water was added without salt or sugar, to give a total of 660 grams. After processing it was found that of those given the short blanch, the peas in grade 1 had taken up but little of the liquor, and those in grades 2 and 3, particularly the latter, had taken up so much of the water as to leave an insufficient amount to cover the peas in the can.

The appearance of the liquor was best on grade 1 for the one minute blanch, and good for the five minute and ten minute blanches; on grade 2 it was best for five minute blanch, and on grade 3 best for the ten minute blanch. The liquor on grade 1 was clear, on grade 3 cloudy but thin, and on grade 3, thick and starchy. The peas in grade 3 for the one minute blanch had formed a solid mass with the liquor so that half of the peas would not fall out when the can was inverted.

Tender peas which are overblanched, soften, break open, and discharge free starch grains so as to make a muddy liquor, and if in great excess, the liquor in the bottom of the can becomes pasty. Old peas which are underblanched remain hard and unpalatable after processing, or, if given a hard process, they will take up all the liquor in the can and become a more or less thickened mass. Such peas never have clear liquor. If the tender and hard peas be mixed, and the blanching be set for the young peas, the older

ones are not well done; if set for the older peas, the tender ones are overdone. It follows, therefore, that to get good results requires much judgment, and a system of blanching tests could possibly be worked out to advantage.

The operation of blanching peas is of comparatively recent introduction in the pea-packing process and at first was thought to be an unnecessary step. When the liquor was unattractive, the peas were placed in loose bags or perforated buckets and suspended in hot water for a short time, after which the water was drained off. From this practice the operation of blanching developed, and at present a number of blanching devices are on the market. Those seen in operation are of two types. In the older one the peas are held in a wire basket which is suspended in a trough of hot water. The trough is usually long, and mechanical devices are arranged to carry the baskets through at such a speed as will insure their being given a certain length of time for the different sizes. These tanks vary from 20 to 80 feet in length. The second type of blancher is that of the continuous washer. A cylinder is made to revolve in a shallow tank of water and if run at a given speed, the peas will be delivered at the opposite end in a given time. Some of these cylinders are sectioned in order to have cleaner water as the blanching progresses. The hot water is admitted at one end and the waste escapes from the opposite end. The raw peas and the water enter opposite ends of the trough so that the clean peas do not come in contact with the dirty water. From a sanitary standpoint, this is the better type of apparatus, though in practice, the trough blanchers are probably the more economical, but not so cleanly.

POKE STALKS.

Select stalks not over 4 inches long, and showing but a single tuft of leaves at the top. Wash and crisp in cold water, tie in bundles and blanch 2 minutes in bath containing salt ¾ lb., water 12½ gals. Place in side opening cans, fill with brine (2½ lbs. salt, 12½ gals. water). Solder lids and exhaust No. 2 cans 9 minutes, No. 3 cans 10 minutes. Tip and process at 240 degrees, No. 2 cans 25 minutes, No. 3 cans 30 minutes.

PUMPKIN.

Pumpkin Standards as adopted by Indiana Canners' Association:

No. 3 Standard—Minimum gross wt., 36 oz. and 31 oz. medium solid packed pumpkin; not over 1 inch from top of can.

No. 3 Extra—Same as above, except ½ inch from top of can: solid pack.

As with many other articles, if the public were only educated to the use of canned pumpkin, told that such a thing may be gotten, that in the canned article the housekeeper is freed from all the bother and worry of preparing the green article, and has the "ready-for-use" pumpkin right at hand, the demand would easily be found.

Pumpkin can be obtained and canned at a comparatively low figure, though arrangements must be made with the growers beforehand, so as to assure a crop. Coming, as it does, after the rush season of canning, and being an article which will keep indefinitely

in its green state, all the time and care necessary to the production of a fine article may be given to it. Pumpkin should be grown cheaply, as it can be sown on the same ground and at the same time as corn, coming in when the corn has been removed.

In the packing of this article there is one machine which has played and still plays a most important part—the Cyclone Pulp Machine. This machine converts the pieces of cooked pumpkin into a fine pulp or paste, a condition which is essential with this article.

There is a large amount of pumpkin put up in No. 10 cans for pie-making purposes, but the most popular style is the No. 3 can, which is suitable to family use.

THE FORMULA.

Open the pumpkin and remove the seed; cut the flesh in pieces of convenient size and cook 10 minutes; pass through a rotary pulper, place the resulting pulp in cans, cap and exhaust No. 3 cans 10 minutes at 212 degrees; tip and process 90 minutes at 250 degrees.

Should the pulp thus obtained be too thin and watery, the water may be exhausted by any appropriate method.

Gallon or No. 10 cans, exhaust 15 minutes at 212 degrees, tip and process 40 minutes at 240 degrees.

If processed in open bath, would give pumpkin 75 minutes at 212 degrees with 10 minutes exhaust. This time may be shortened if the pulp is partly cooked in a jacketed kettle before placing in the cans to one hour. This for No. 3 cans.

OLD JERSEY STYLE PUMPKIN BUTTER.

Peel and clean the pumpkins, cut in small pieces and boil in water until thoroughly cooked. Pass through pulping machine. Place 100 gals. of this pulp in jacketed kettle with 50 lbs. sugar, ½ lb. ground cinnamon and ¼ lb. ground ginger. Cook down to a butter thick enough to stand while hot. Pass through finishing machine. Some think the addition of a few sliced lemons improve the flavor.

RHUBARB.

Wash in cold water, cut in pieces 1 to 1½ inches long, place in cans, hot dip in water, cap, tip and process at 240 degrees, No. 3 cans 5 minutes, No. 10 cans 12 minutes; at 212 degrees, No. 3 cans 15 minutes, No. 10 cans 25 minutes.

SALSIFY.

Wash and scrape the roots; as soon as scraped, throw in a bath containing 1 oz. Sulphite of Soda in 12½ gals. water. Blanch 5 minutes in boiling water, place in cans and hot dip in brine (salt 2 lbs., water 12½ gals.). Cap, tip and process No. 2 cans 40 minutes at 240 degrees.

SAUER KRAUT.

Kraut Standard as adopted by National Kraut Packers' Association, *Indiana Canners' Association and Ohio Canners' Association:

No. 3 Standard—Minimum gross wt. of can, 39 oz. and 24 oz. of well-cured kraut; reasonably dry; ⅛-inch wire mesh used for draining.

Sauer kraut has met with considerable favor, and the extent of the pack is rapidly increasing. Those who are in a position to put down their own "kraut," as is done in many sections, should be able to can and place this article on the market at a profit.

As will be seen in the formula, kraut is nearly always put up with a piece of pork or sausage and packed in No. 3 cans.

The following sauer kraut receipt is from one of the largest kraut manufacturers in Germany, where the celebrated Magdeburg sauer kraut is made. To get the sweetish-sour flavor it is necessary to cut the core in with the kraut. This can only be done by using a core cutter.

First remove the outer green leaves of the heads, then the core is taken out with the corer, *but far superior kraut is attained by using a core cutter,* whereby the core is utilized instead of going to waste. The heads are then put in the kraut cutter, to be cut in the longest, finest strings possible, which can be done if the core is left in. The kraut must be put in the barrels as soon as possible after it has been cut, as too long exposure to the air without being salted will impede the fermentation of the kraut. Cabbage exposed to the air after being cut is also apt to turn grey or black.

The bottom of the sauer kraut barrel should be lined with loose cabbage or grape leaves. Then a layer of the cut cabbage about 6 inches deep is put in and strewn with salt and a few juniper berries. The amount of salt used not to exceed 4 per cent. of the amount of cabbage (in weight—4 lbs. salt to 100 lbs. cabbage). After the layer of cabbage is salted, it is pressed or stamped down firmly and evenly, by which process the air, which prevents the proper fermentation of the kraut, is expelled. In this manner layer upon layer is packed in until the barrel is filled. The cabbage is then covered with a perforated hardwood cover, which is weighted down with stones or a press attached to the barrel, to prevent air from coming in contact with the kraut. *Always keep the kraut covered with brine.*

The sauer kraut ought to ferment in the brine for a period of about 3 to 4 weeks. That the fermentation process has ceased is best ascertained by the fact that no more gas bubbles are noticed. If the kraut has arrived at this stage, it ought to remain undisturbed for about 4 or 5 days longer, and then be filled into tubs.

**This association says, ¼ inch screen and "reasonably long cut."*

By salting, the greatest part of the water contained in the cells of the cabbage is extracted, and in combination with the salt forms the brine.

Kraut requires the most careful attention while it is in the state of fermentation. It will not ferment well in too cool a place, 59 to 64 degrees is about the right temperature. After the kraut is fermented it will keep best in a cool place.

That the cabbage will ferment more speedily, some manufacturers add one tablespoonful of skimmed sour milk to each barrel of kraut. This is put in with the kraut as it is cut and put in barrels.

It is figured that one ton of good, solid cabbage makes four whiskey barrels full of kraut, and that one barrel of this kind will fill 250 No. 3 cans. Thus one ton of cabbage will produce about 1,000 No. 3 cans of kraut.

THE FORMULA.

Remove the kraut from package and wash thoroughly with cold water; place in kettle or tank with closed coil, cover with cold water, adding 10 lbs. of salt pork for each 100 lbs.; bring to a boil and cook slowly 3 hours. Remove the pork, cut in thin slices and place a slice in each can, fill the can with the kraut while still hot, cap, tip and process No. 3 cans 1 hour at 240 degrees.

SAUER KRAUT, WITH VIENNA SAUSAGE.

Handle same as above, substituting very small Vienna sausage for the pork. Give the sausage a preliminary cook of 1 hour, instead of 3 hours, as in the case with pork.

SPINACH.

This article seems to find a quite ready market and at good prices, but it must be packed with care and handled in the proper manner. It is generally put up in No. 3 cans, though it is not improbable that an extensive trade among hotels and restaurants will, at no distant day, find immense packings in gallon cans.

"Trade" Standard—Cans to cut out full, gross weight No. 3 cans 39 oz.

Have spinach delivered to factory in splint baskets or slatted crates. If necessary to store on floor, do not make piles more than three feet deep.

In preparing, first pick off all dead leaves; break or cut leaves from stems; wash thoroughly in cold water to crisp and remove all earth and grit; blanch two minutes in boiling water; pack in No. 3 cans; hot dip in 3 per cent. brine; cap, tin and process.

30 minutes at 240 degrees.
40 minutes at 212 degrees.
No. 10 cans, 2 hours at 212 degrees.

Cool cans after processing.

Steaming may replace the blanch, and in the power factory, for washing and steaming spinach, a power washer and scalder are used to advantage.

The stems may be utilized for "chopped" spinach. Cut off roots, wash stems; blanch in boiling water 5 minutes; run once through pineapple grater (saw machine); place in jacketed copper kettle with sufficient 3 per cent. brine to make it handle and fill readily; bring to a boil and fill in cans; cap, tip and process same as above. A proportion of these ground stems may be used with the leaves in packing seconds.

The stems may be also used in making a sour "relish" or "hash." To prepare them for this purpose, remove roots, cut in small pieces, wash in cold water and salt same as cucumbers.

SQUASH.

Handle and process same as pumpkin.

SUCCOTASH.

Standard of the Baltimore Canned Goods Exchange: "Cans to be full of green corn and green Lima beans."

Pack same as Maine style corn, adding to the corn while in mixer 20 per cent. to 33 1-3 per cent. young Lima beans. Process No. 2 cans 60 minutes at 250 degrees and cool in retort.

Dried Lima beans may be used with the green corn, but must be labeled as such, under the Pure Food laws.

SWEET POTATOES.

This article in recent years has attained to quite an extensive pack, and demand has kept pace with it. Like the foregoing article, this also offers the progressive packer an opportunity to increase the extent of his packing along a profitable line.

Sweet potatoes are difficult to pack, and require considerable attention and care, because, if not handled properly, an unsightly, poor article will result. There are two styles of packing, one being the whole potatoes, packed as dry as possible, the other being pie stock, in which the sweet potato appears as a pulp.

The difficulty in packing the first style is to keep the potatoes dry; that is, so that they will cut out from the can comparatively dry; by which is meant that they must not be in a soft, mushy, water-soaked condition. As will be seen in the formulae below, it is necessary to parboil the potatoes, and the nature of this vegetable is to absorb water. Therefore, care should be taken to select a good quality of potato, one which will cook "dry," as it is termed. Different packers resort to different methods to obtain this result; some even placing the parboiled potatoes in a pan and running them into an oven for a short time, thus virtually baking them. But this method is almost too expensive, and is not advised, except for "extras" and the finest packs.

The formulae given here have been in use for a number of years and have given general satisfaction. But in this, as with all other articles, care should be taken to cook a trial batch of goods in order to test the quality of the stock you are working on, for a difference in soil, fertilizers used, etc., will make a difference in the texture of the potato, and this must be overcome by such slight modification of the directions, that is, in the time, as may be required.

It has been found that almost every section of the country has to employ a different time of process owing to wide variations in the nature of the potatoes, and great care must be exercised in this respect.

Difficulty has been encountered with this article in not having the heat properly penetrate the entire contents of the can, because sweet potatoes seem to possess a strong resistant power to heat. Here is a point to watch, for the cans must be heated through their entire contents in order to secure good goods.

In preparing the second class, or pie stock, all the potatoes are available. Because, however, of the difficulty to get the proper heat throughout the can, some packers have taken to running the pulp through a corn cooker and filler, and have stated to us that they secured better results in this way. The formulae given below for this class of foods will be found satisfactory under all ordinary circumstances.

FORMULA.

Select yellow-skinned potatoes, small enough to go through can hole without cutting; place in steam bath and cook until about ¾ done. Scrape off the skin, holding the potato in the hand, which protect with a cloth or heavy mitten. Do not hold on a fork to skin; if the potatoes are punctured with any pointed instrument, they will cut out watery after processing; place potatoes in can while still hot, packing as solidly and closely as possible. Cap, tip and process No. 3 cans 70 minutes at 240 degrees.

SWEET POTATO PULP (FOR PIES).

Wash the potatoes and rub off rootlets, cook one-half hour in steam bath or boiling water, pass through rotary pulping machine; place the resulting pulp in cans while hot; cap, tip and process 70 minutes at 240 degrees for No. 3 cans.

TOMATOES.

Tomatoes have been termed "the poor man's meat," and are, in connection with the pulp, the most important item handled by canned food packers. There are more packers handling this article than any other single article in the entire list; and, as a consequence, the total output of canned tomatoes is far in excess of all others. Many factories handle this crop alone, packing nothing else; a great

number handle it together with corn, but nearly all factories handle tomatoes in some manner; as the regular canned article, as an article of especially fine packing in glass, or use the pulp in connection with baked beans, catsup, soups, or in some of the numerous ways in which tomatoes or pulp can be used. While the use of the tomato in this respect was, up to a few years ago, entirely confined to the Continent of North America, it may now be said to be of universal use wherever canned foods are put up.

As years go by the amount packed and consumed is greatly increasing, as is shown by the fact that twenty years ago a pack of 5,000,000 cases (figured on No. 3 cans, 24 cans to the case) was considered a large pack, whereas in recent years it has averaged about 14,000,000 cases, nearly three times the above figures, and the consumption has kept pace with this increase. It cannot be expected, however, that this rate of increase will continue, but it is a fact that there is room for still further increase in the number of cases put up, but the consumer must be educated to the use of the canned article, and there can be no education so effective as the packing of good goods.

Quality is always the most important factor the canner has to consider, whether he is new in the business and just starting, or whether he has been long in the industry, for, as the canning of tomatoes affords the greatest opportunity for evil, because it is the greatest pack in extent, quality must be the keynote of that industry. Besides, it is only the part of wisdom for the packer to keep his quality up, for, if he allows it to go down, his business will go with it. All packers, of course, cannot pack extra tomatoes and expect to sell them at extra prices, for there is the inferior demand to be filled; but let him be honest in what he does, labeling his extras as extras, his standards as standards and his seconds as seconds, and not attempt to label his seconds as standards, and even extras, as is sometimes done, thus deceiving the consumer; for, while he may succeed in such methods once, he will not again, for he will not have the chance.

In the canning of tomatoes there are, perhaps, more methods employed than in any other article; that is, in respect to the mechanical working of the factory. In the beginning of the industry the only piece of machinery, so to call it, in the factory, was the process kettle; the scalding in hand baskets, the peeling, the filling into cans, the capping and the tipping were done by hand labor.

Other tomato-canning factories are almost entirely mechanical throughout, these being the latest production in their line.

The peeling of tomatoes has long been a knotty question, defying the attempts of our best inventors, for it has seemed impossible to secure a mechanical device which would do the work well and rapidly. Thus the tomato packing house is compelled to secure a large number of hands as "peelers," and the situation of the factory

has, therefore, to be such as can command a large supply of help. This is, perhaps, a more serious question than that of the growing crop, for in the average the acreage can be secured, but if arrangements have not been made beforehand for a good supply of reliable help, the packer may find that he cannot secure it.

A CLEAN TOMATO CANNERY.

It must be remembered, food inspectors, both State and National, will drop in to see how you conduct the operations. The following article was written to give directions in this regard, and published in THE CANNING TRADE. The author was then a Government Inspector.

The recent regulations adopted by the National Canners' Association, and which, it may be said, are the basis upon which food inspectors work, should be carefully read in connection with this. They are given in the forepart of this book, under General Directions.

THE SITE.

The first thing noted is the site on which the factory is built. Strange as it may seem, many factories are built in hollows, where good drainage is impossible, and where the water will stand around under the floors until it stagnates, and the juices from the gutters and floors rot and decay, causing a stench that is anything but creditable to the industry. On the other hand, many factories can be put into quite good shape on their present site, by filling in or even by the proper gutters being dug so that all water will be carried to a point distant from the work. By all means, this should be done. Do not have a cesspool at the side of the factory into which to drain all slop, much less to receive the tomato skins and cores, under the excuse that in a short time after work is done—that is, after the season is ended—"a crust forms over this and no smell comes from it." We have noted on occasions when we visited some factories that two and three years' accumulation of tomato skins and waste have been piled one upon the other, at the side of the factory, causing a pile or sea of rotting filth, which, if it were prodded into, let out a stink that made that factory famous in its neighborhood, and was the talk of the country around. The excuse was made that if the crust were not broken no odor came from it, and that the new slop piled on it this year would soon take on a crust, and not cause any trouble. It is hard to believe that in this twentieth century there are such things, but such is the fact, and it should not be tolerated for a moment.

Again, many factory owners seem to take particular pains to push out all skins and slop to the side of the factory facing the railroad, as if they wished the public to see the dirty end of the business first, last and always. These skins should be hauled away from the factory and scattered on the fields, where they will dry and disappear, and really form a good fertilizer. This can be done without much expense or trouble, if when the season first starts the work is then begun and kept up. A man with two carts can keep a very large plant going.

Then the driveways and roads leading to the factory, particularly around the factory doors, should have attention, and be not allowed to take on the appearance of a quagmire. The use of a few car loads of ashes, or oyster shells, will add an entirely different appearance to the factory site and pay the owner many times over in time saved on hauling, wagon repairs, etc.

THE BUILDINGS.

There are tomato canneries in various sections of the country that are as finely constructed buildings as any one could wish to see. Built of good, substantial timber, with high ceilings and cemented floors, drained by gutters at proper intervals, all leading into a central covered gutter that empties on the outside into a sewer which carries the water and waste hundreds of feet from the factory. The roofs are of galvanized iron, and inside and out the whole factory is painted from ground to peak of roof. Such a factory, with plenty of windows, or else open on all sides, with a good skylight as ventilator to carry off the steam and heat, always presents a pleasing appearance to any visitor.

The factories we have described above are not too good to produce a food product people have to eat. Never lose sight of the fact that you are producing food.

The tomato cannery should be built in a good, substantial manner, with high ceilings in every department, concrete floors throughout and the entire inside treated to a good coat of either cold water paint as the best, or at least a yearly coating of fresh whitewash. If wooden floors are laid, let them be tight, not open so as to drain through to the ground, where the juice will ferment and cause a stench; and let there be plenty of pitch to them, or with proper gutters placed at regular intervals, preferably under the floor, so that all water, etc., will be carried off at once and lead away from the factory. The more these gutters are kept out of sight the better, but attention must be given them in that case to see that they do not choke up. With such an arrangement the factory can be continually kept clean by having a boy with a hose, whose duty it will be to keep the floor clean. We can hear the answer to this, that they wash down regularly twice a day—at noon, and at night when the work is done. This is better than not at all, but a factory will be judged of its cleanliness while it is *at work* and not while it is idle either at noon or at night. The food the factory produces will not be dirty, because the factory is clean when it is not working; nor will the operation seem clean during work on this account.

Given a properly constructed factory, on a good site, with well kept approach to it, let us see the mechanical arrangement of it. We will comment briefly on each step.

THE SCALDER.

By whatever means you scald the tomatoes see that the water is *kept clean.* If you are running a power scalder, it will pay you to put a washing attachment to it, so that the tomatoes will be first washed of their sand and dirt, and then dumped into the scalding water. This first attachment can easily be secured, and is being used by many canners now; the running water keeping the tank supplied with sufficient water to make it clean. Then the hot water tank will not have to be changed so often, and time will not be lost in this. But don't make the excuse that you can change the water in the scalder twice a day, in the morning and at noon. You know that the water is muddy and dirty looking, and *is dirty,* and no amount of argument could make an inexperienced person think that tomatoes first dipped into such a solution could be anything but dirty. It would be better to have two scalders than that the public should condemn your goods for this reason. Keep the water in the scalder clean. We know this is a sore spot, but we know what we are speaking of, too; and we would simply ask you, is it better to take the time or the expense to do this and keep the scalder going, or neglect it and have your scalder and the whole factory given an indefinite rest?

To the man using the hand dump scalder we give the same advice. If you cannot keep the water *clean* in the box you now run, and it takes too much time heating up, get another one and run two. They do not cost much, at least not as much as your business.

PEELING TABLES.

Of the variety there is no end, and each user fancies his style above all others. We are not going to set down any particular kind, except that it be such that it will hold the scalded tomatoes, the skins and the water therefrom, and not permit a continual slop on the floor and on the dresses of the operatives.

These tables should be so constructed that they will hold the buckets of scalded tomatoes, not dumped into bins, a bucket for the skins and one for the peeled tomatoes. Each bucket of scalded tomatoes should be worked out completely, whereas if they are dumped into the bins as soon as the supply gets low a fresh lot is poured in, and the first tomatoes get into corners, sour and cause trouble in the process.

The workers should be compelled to keep the skins off the floor and in the bucket where they belong. It will be necessary to educate the help to this. If these workers were fined for each piece of skin found on the floor at their feet, there would soon be an end to this slop.

If the conveyor is used—and this is the proper thing for every tomato cannery—there is really no excuse for slop on the floor; in fact, we have seen the floor of a tomato canning factory under and around a conveyor *dry*. This is as it should be.

As the operation of "skinning" tomatoes draws the lowest class of help, it is often found necessary to allow the women to bring their children of all ages, from babes in arms to 6 and 8 years. Some factories would tell you they could not operate if they excluded the children, because the mothers would have to stay home. This is true but unfortunate, for under such conditions it is next to impossible to keep appearances above reproach. And yet it must be done; the children must be kept out of the factory and away from the food. Other lines of business have the same troubles, but they do not permit the children to play around their mothers, much less help in the work, and the canners will have to take the same action.

TRACKING OF SLOP ABOUT FACTORY.

One of the reasons for saying tomatoes cannot be canned without slop is that the scalded tomatoes must be handled in buckets, the peeled ones taken from the skinners to the filling machines or fillers in buckets, etc. Some even use baskets for these operations, and there is little room for wonder that the floors become mucky with mud and refuse, and the men doing this work wear rubber boots. But all this slop and dripping can be avoided if tried. As we have said before, every tomato cannery should be equipped with some kind of a continuous conveyor, so that the tomatoes would be taken from the scalder in solid buckets, never in baskets or buckets with holes in the bottom, and delivered to the women as they sit at their work. The peeled tomatoes are likewise carried to the given point in buckets and removed from the carrier to the filler, and the buckets of skins in their turn taken off at a given point and dumped. Properly managed, such a system can be kept neat and clean.

But where this system is not in vogue, let the skinners work out of the bucket in which the tomatoes are brought to them, putting the skins into another, and the peeled tomatoes into a third. Do not let them overload the skin bucket, and make them be tidy in their work. Don't have muck and moisture tracked all over the floor.

THE FILLER.

Where a machine filler is used, a little care in putting up the buckets of tomatoes will prevent slop. The tomatoes should be dumped on what might be termed a skimming table before being fed into the hopper of the machine. Right here, we believe, the question of standards can be largely settled. If this skimming table be made of zinc or of extra coated tin, perforated so that when the tomatoes are thrown up onto it, and spread

out thin all water will run off, it will give the operator on each side of it a chance to pick out all under-ripe and broken tomatoes, and all extra fine ones if desired. Sorted over in this way the tomatoes that are allowed to pass to the filler will be found to be the good average quality of the run, the standards, and being drained as we have mentioned, will be filled into the can solid. A well filled can of such product cannot be anything else than a standard, whether it be packed in New Jersey, Maryland, Indiana or California.

The finer tomatoes that have been selected from the standards may be hand filled for extra standards; and the broken ones, the partly green and the off-colored tomatoes, can be filled on another machine as seconds.

THE SKIMMING TABLE.

A word as to this skimming table. Do not let the juice and water drain down onto the floor to make a sloppy condition under foot. Provide a drain pipe, connecting with the gutter running under the floor, or elsewhere, and catch this together with the slop from the plunger and the "slop stick" and do not let it accumulate. Take a little care of your filling machine, and it will give you better service, and more of it.

Hand filling can be done from clean tables, lined with zinc or heavy coated tin, or better still from enameled lined tables, and the stock can be sorted over in the same way, as above. All drain from this should be connected to the gutters by spouts, and not allowed to fall the height of the table. This juice is valuable if saved carefully and in a clean way.

WIPING AND WIPING MACHINES.

As simple, as effective and as cheap as automatic wipers are, it is surprising that any factory runs without them. A good machine can be bought for a few dollars.

CAPPERS.

There is little to be said here regarding the capping, because the automatic capping machines have been so perfected they can practically speak for themselves. The method of fluxing used on these machines leaves nothing to be desired; but this cannot be said of the factory using the old style of capping by hand. Frequently the flux is applied to the tops of the cans, about like the wiping is done with the scrub brush, and in a manner that appeals to one's appetite just about as much.

With the cans sealed the contents are out of danger of contamination, and the processing, cooling and storing may be left to the good judgment of the man in charge, always, however, bearing in mind that neat appearance in these departments is as much desired, and as beneficial to the factory owner as anywhere else. And that an orderly, well conducted process room and warehouse will turn out fewer "rejections," "swells" and other causes that show directly on the wrong side of the ledger.

THE OPERATION.

Tomatoes should be delivered to the factory when thoroughly red ripe, but not overripe, in shallow, slatted crates, 7 to 8 inches deep, with hand-holes cut in each end. They should not be carted in deep boxes or conical splint baskets in which the weight of the fruit on top will crush or bruise the bottom layer. There are specially contrived carriers for tomatoes, and the progressive packer should have his own supply of these, which, when "picking time" comes, can be loaned to the growers and returned by them when picking and hauling are finished. A record must be kept of such, and the grower held responsible for the good condition of the carriers.

SCALDING.

The proper scalding of tomatoes is an operation to which frequently too little attention is given; and often defects in the pack can be traced to improper scalding and delay in handling after scalding.

Keep the scalder up to the peelers, but not ahead of them. Many cases of swells have been traced to scalding, or rather a partial cooking in water that was not actually boiling, the long immersion and consequent softening and heating of the flesh making an excellent medium, in first-class condition, for the development of certain germs that are not destroyed by the ordinary processing.

The best method of scalding is with a machine, or machines, so arranged that the tomatoes are first washed in warm water, then subjected to the action of jets of live steam for just a sufficient period to properly start the skin, and are then plunged immediately into cold water before being delivered to the peelers. When tomatoes are washed and scalded in water in the same tank, the water must be at an actual, active jumping boil in order to obtain the best results, and, if afterward they are given a bath in cold water, an effect almost equal to steam scalding may be obtained. Tomatoes thus chilled with cold water, after either steam or water scalding, will be firmer and pack a more solid can, will enable the peelers to work more rapidly and will avoid some bacteriological complications which are apt to occur if tomatoes are scalded too far ahead of the peelers. The scalded fruit may be delivered to the peelers in buckets, but no scalded tomatoes should be delivered to a peeler until all the previous supply is skinned.

In many recent investigations an undue loss by "swells" has been traced to the stationary bins used in some systems for holding the supply of scalded tomatoes for the peelers, and which, when nearly empty, are replenished with a fresh supply. As a consequence, it is quite possible that a portion of the first delivered are the last skinned, and this may cause a variety of trouble, especially where the tomatoes have not been cooled after the scalding.

PEELING.

In peeling tomatoes, always remove the core first, using a knife with a short, narrow blade, holding it in such a manner that the point will reach near the centre of the tomato and slanting the blade at the stem sufficiently to cut out the harder portion of the core, but not enough to cut into and open up the seed cells. If the seed cells are cut, slightly, solid pack cannot be made. Even when the tomatoes are so green at the stem end that much of them has to be cut away, insist that your peelers remove the cores in this manner and afterwards cut away the green portions; it will save a large percentage of waste.

SCALDING AND PEELING TOMATOES.

By W. C. Smiley.

In some respects I shall speak to you from the experience and to the interests of the smaller canner. Some of the principles I shall advance may not be applicable to those who are more extensively engaged in the business, they may not be practical, but to the smaller canner they are essentially so.

First, if the conditions of the weather are such as to permit it, if the nights are dry and cool, the fruit should be allowed to stand in the yards or somewhere in the shade for at least twenty-four hours after gathering before going to the scalder. This setting in the shade helps to color up the fruit and cause the peel to loosen from the pulp, so that when they go to the peeling table and are peeled they present a beautiful smooth surface. They will scald more quickly when they have been allowed to stand awhile, which also proves a great advantage to the fruit. In scalding we prefer the open vat scalder, as we believe it has some advantage over the continuous scalders.

When the scalder is in use the water should be kept as hot as water can well be made, so as to make the scald as quickly as possible. A sufficient amount of water should be kept in the scalder to keep the tomatoes from packing in the bottom of the scalding basket. The boil of the water should keep the fruit moving in order to get a uniform scald. After the tomato has been in the scald something like a quarter or half a minute (the time should be judged by the condition of the fruit) they should be raised and aired a few seconds. This causes the peel to contract and break, releasing the steam that gathers just under the peel, and keeps it from penetrating and softening the tomato. After airing a bit they should be let back into the water a few seconds again to finish the scald, then they are ready to go to the peeling table, where they should be spread out enough to allow the steam to escape while being peeled.

Now, permit us to explain the advantages of a quick scald over a slow one. In a slow scald you heat the tomato through to the seed cells and loosen the substance about the seed, soften the pulp, and draw the juice of the tomato to the surface, thus making it difficult for the peeler to hold, making it necessary for them to squeeze the tomato in the hand in order to hold it while removing the stem. This squeezing the tomato forces the juice and softened pulp to the stem end, and when the peeler cuts into it a large per cent. of the pulp and juice runs out and is wasted. The peel adheres to the softened pulp, making it almost impossible for the peeler to remove the stem and peel without tearing the tomato to pieces. Where, on the other hand, if the tomato is scalded quickly it does not get hot sufficiently deep to soften it and the peelers can remove the stem and peel without damage or waste of fruit.

Care should be taken not to allow the tomatoes to become piled in bulk while hot, as that would have a tendency to soften them. Some canners use the individual box and give each peeler a bushel or half bushel, as the case may be. We don't approve of this from the fact the tomatoes in the bottom of the individual box will soften before the peeler can get to them.

Every precaution should be taken to keep the fruit from getting too hot before it goes to the packing table or machine in order to keep it firm and get a solid pack.

The demand of the trade is becoming more for quality than for quantity, and it is entirely to the canner's interest to get the tomato in the can as nearly whole as possible, not from the standpoint of a good standard only, but from the point of business economy. Thousands of dollars of raw material go out over the peeling table in waste every year that should otherwise be added to the canners' profits.

The manager of every factory should give strict attention to his peeling department to see that the tomatoes are not unnecessarily chopped up and wasted. Great care should be used in peeling not to open the seed cells when it is possible to avoid it, as deep cutting causes a double waste. In the past few years I have spent quite a bit of time at the peeling tables personally and have made a close study of that branch of the business, and find it of vital importance. The first essential in peeling tomatoes is to be careful in removing the stem to cut shallow, and run the knife as close in to the stem as possible. This avoids waste and leaves the tomato in its natural shape. Of course we advocate the spoon-shaped or concave knife for peeling. Experience has long taught us its value as a time and fruit saver. The straight-blade knife is clumsy and awkward to handle, putting into the peeler's hands too great a temptation to waste the fruit by unnecessary cutting, while the concave knife fits the ball of the thumb, which acts as a guard against deep cutting and can be run close into the stem, making a clean-cut job and with no damage or waste of fruit.

Proper scalding and reasonable care not to expose the seed cells in peeling will not only raise your quality, but will greatly reduce your cost price, add to your profits and serve to strengthen the industry.

The present condition of the business demands that we reduce our cost and raise our quality, and to do both we must make use of the double advantage we would have in saving all that is possible in raw material and in putting it in the can in the best possible condition.

Should your daily pack average less than 15 No. 3 cans per bushel, look first to your peelers, then to the scalding and then to the tomatoes as received.

After peeling carry to the packing machine, where place them on a perforated table level with the top of the hopper, for examination and draining off surplus juice. Make suitable provisions for saving this juice and that from the packing machine, for use in high-grade catsup and baked beans. There is more flavor in this juice than in the pulp of the tomato, and whenever possible it should be utilized.

After filling the can solidly with fruit, top it, or press down the tomatoes with a "slop" stick made just large enough to allow for the expansion during the exhaust and process. At this point in the operation it is advisable to have a set of scales and frequently test cans to see that they are averaging the standard weight; this is the place to correct weight, not after the cans are sealed. When properly filled and tipped, wipe the cans, cap and, if cold packing, tip. If exhausting (hot pack), cap and *exhaust No. 3 cans ten minutes* either in water *at 212 degrees,* or, which is preferable, in a continuous steam exhauster for the same time. The exhausting of uncapped cans in large steam boxes, except sanitary cans, is not advised for several reasons. First, on account of the delay which is bound to ensue after removal from exhaust, before all can be capped and the danger of fermentation during this delay; second, if topped sufficiently to make safe and easy capping, the finished cans will be slack filled; third, if not sufficiently topped, capping will be difficult and many cap and tip leaks may be expected. In the case of sanitary cans, as they pass immediately to the sealing machines, the above dangers are avoided. The exhausting of uncapped tins in tanks of water is even less advisable than the use of large steam boxes, and is a method which should never be employed. It possesses all the evil features of the steam box, and necessarily entails the loss of considerable flavor.

From the moment the tomatoes are scalded until in the process kettle they must be kept constantly moving. At the noon hour get all into the process kettle before stopping. *Peeled tomatoes standing in buckets in their own juice will frequently ferment in half an hour, and in cans which have been exhausted, uncapped, in* 10 *to* 15 minutes.

DIFFERENCES in climate, soil and fertilizers make important changes in the chemical and physical properties of tomatoes, AND UNDER NO CIRCUMSTANCES SHOULD A LARGE PACK BE MADE IN A SECTION WHERE CONCLUSIVE PRELIMINARY TESTS HAVE NOT BEEN MADE.

F. I. D. No. 144.

FOOD INSPECTION DECISION 144: The text of this decision is as follows: Use of water, brine, sirup, sauce and similar substances in the preparation thereof. The can in canned food products serves not only as a container, but also as an index of the quantity of food therein. It should be as full of food as is

practicable for packing and processing without injuring the quality or appearance of the contents. Some food products may be canned without the addition of any other substances whatsoever—for example, tomatoes. The addition of water in such instances is deemed adulteration. Other foods may require the addition of water, brine, sugar or syrup, either to combine with the food for its proper preparation or for the purpose of sterilization—for instance, peas. In this case the can should be packed as full as practicable with the peas and should contain only sufficient liquor to fill the interstices and cover the product.

Canned foods, therefore, will be deemed to be adulterated if they are found to contain water, brine, syrup, sauce, or similar substances in excess of the amount necessary for their proper preparation and sterilization.

It has come to the notice of the department that pulp prepared from trimmings, cores and other waste material is sometimes added to canned tomatoes. It is the opinion of the Board that pulp is not a normal ingredient of canned tomatoes, and such addition is therefore, adulteration. It is the further opinion of the Board that the addition of tomato juice in excess of the amount present in the tomatoes used is adulteration—that is, if in the canning of a lot of tomatoes more juice be added than is present in that lot, the same will be considered an adulteration."

THE STANDARDS.

TOMATO Standards, as adopted by the Indiana Canners' Asso.
" " " " " Ohio " "
" " " " " Tri-State " " *
" " " " " Iowa " "

Weights as here given are the minimum. Contents of can drained on ¼ inch wire mesh flat screen for two minutes.* 98 per cent. of shipment to comply with stipulations. 5 per cent. of shipment considered fair average for testing.

No. 3 Standard—Gross wt. 37 oz. and 19 oz. of average ripe tomatoes; not necessarily all red.

No. 3 Extra Standard—Gross wt. 38 oz. and 20 oz. of well selected, ripe tomatoes.

No. 3 Fancy—Gross wt. 38 oz. and 20 oz. of hand-packed, whole, ripe, tomatoes.

No. 2 Standard—Gross wt. 23 oz. and 12 oz. average ripe tomatoes; not necessarily all red.

No. 10 Standard—Gross wt. 118 oz. and 64 oz. average ripe tomatoes; not necessarily all red.

*Tri-State has only the Standard, no Fancy or Extra.

**Tri-State—One minute.*

(NOTE.—The above standards are given merely as a guide, because since the Government's ruling under F. I. D. No. 144 the method of determining by weight has been abandoned as wholly impracticable, and the various Associations have withdrawn these previously adopted standards.)

THE PROCESS.

For Cold-Packed Tomato Process:

No. 2 Cans, 12 minutes at 240 degrees; 35 minutes at 212 degrees.
No. 3 Cans, 15 minutes at 240 degrees; 40 minutes at 212 degrees.
No. 10 Cans, 30 minutes at 240 degrees; 75 minutes at 212 degrees.

For Hot-Packed Tomatoes:

No. 2 Cans, exhaust 8 minutes at 212 degrees.
No. 3 Cans, exhaust 10 minutes at 212 degrees.
No. 10 Cans, exhaust 15 minutes at 212 degrees.

For Hot-Packed Tomatoes (Exhausted) Process:

No. 2 Cans, 8 minutes at 240 degrees; 25 minutes at 212 degrees.
No. 3 Cans, 10 minutes at 240 degrees; 30 minutes at 212 degrees.
No. 10 Cans, 20 minutes at 240 degrees; 60 minutes at 212 degrees.

TOMATOES, WHOLE.

Select firm, solid tomatoes of can-hole size, wash carefully

CANNED TOMATOES, THEIR COMPOSITION

Lab. No.	Capacity, Can cc.	Net Weight ozs.		Solids ozs.	Water ozs.	Percent Water in		Dry Matter			Per cent Solids in can
		Claimed	Found			Solids	Juice	Solids ozs.	Juice ozs.	Total ozs.	
7539	1000	33	34.12	15.87	18.75	90.76	93.86	1.466	1.151	2.617	7.67
7540	1000	33-35	31.87	11.37	20.50	94.24	96.87	.655	.641	1.296	4.06
7541	1050	35-37	33.12	18.44	14.69	88.65	92.23	2.093	1.141	3.233	9.79
7542	1000	33	33.75	17.37	16.37	91.27	95.87	1.516	.676	2.192	6.49
7543	1000	30	33.56	16.44	17.12	87.55	95.23	2.067	.817	2.883	8.59
7544	1000	33-35	32.75	16.19	16.56	91.34	95.00	1.302	.828	2.130	6.50
7545	1150	40-44	39.62	19.87	19.75	92.13	94.78	1.564	1.031	2.595	6 55
7546	1170	2lb 14 oz.	40.06	17.81	22.25	87.82	93.74	2.069	1.393	3.462	8.63
7547	1070	35-37	35.13	20.19	14.94	90.04	93.28	2.011	1.064	3.075	8.75
7551	1000	32	33.00	15.88	17.12	93.20	95.85	1.080	.709	1.789	5.42
7552	1000	31-32	31.94	11.63	20.31	94.84	97.52	.610	.504	1.114	3.48
7553	1025	30-34	33.19	16.50	16.69	90.40	94.24	1.584	.961	2.545	7.65
7554	1000	31-33	34.00	17.50	16.50	91.48	93.91	1.491	1.005	2.496	7.34
7555	1000	42	33.25	20.31	12.94	92.88	95.60	1.446	.558	2.004	6.02
7556	1000	33	32.62	16.87	15.75	92.13	95.29	1.328	.742	2.070	6.34
7556a	1200	33	41.44	22.19	19.25	93.23	95.50	1.502	.866	2.368	5.71
7557	1050	32-36	35.12	18.62	16.50	91.71	94.12	1.543	.970	2.513	7.19
7558	1165	40	39.44	20.66	19.38	92.84	95.13	1.436	.874	2.280	5.78
7559	1150	31-34	36.81	22.06	14.75	94.39	96.17	1.237	.585	1.822	4.95
7560	1150	40-42	40.62	25.06	15.56	92.19	93.98	1.956	.937	2.893	7.12
7561	1000	33	33.94	17.85	16.09	94.72	96.49	.941	.568	1.509	4.44
7562	1050	32	36.00	20.37	16.62	92.12	93.89	1.604	1.015	2.619	7.27
7563	1000	31	31.87	20.38	11.50	93.27	95.73	1.371	.491	1.862	5.84
7564	1050	32-36	35.93	21.31	14.63	92.51	94.97	1.596	.736	2.332	6.49
7565	1150	33-35	38.37	19.87	18.50	91.11	95.69	1.766	.797	2.573	6.70
7566	620		20.67	9.44	11.44	90.89	93.79	.860	.710	1.570	7.59
7567	1150	35-40	40.56	23.12	17.44	92.00	94.85	1.849	.898	2.747	6.77
7568	1040	33	32.75	14.75	18.00	93.55	96.57	.953	.617	1.570	4.79
7569	1150	35	40.31	25.37	14.94	93.74	95.54	2.523	.666	3.189	7.91
7570	1030		34.18	16.50	17.69	90.20	94.02	1.617	1.054	2.617	7.78
7576	1150	40-44	41.12	26.06	15.06	93.48	95.18	1.699	.726	2.425	5.89
7577	1000	33-35	33.68	18.00	15.69	93.02	95.59	1.236	.703	1.939	5.72
7578	1000	30	33.56	13.50	20.06	92.68	95.51	.988	.901	1.889	5.33
7582a	1030		35.56	18.25	17.31	93.21	95.50	1.239	.779	2.018	5.67
Aver'ge	1047		35.11	18.38	16.78	92.04	95.04	1.476	.826	2.303	6.53

Taken from the February Bulletin, Agricultural Experiment Station, E. F. Ladd, Commissioner, Fargo, N. D.

and place in can, fill with cold brine (Salt, 1 lb.; Water, 12½ gals.). Cap, tip and process 35 minutes at 212 degrees.

TOMATO PULP, SWEET, FROM WHOLE TOMATOES.

Wash and scald the tomatoes and run through rotary pulper, place the resulting pulp in a jacketed kettle with bottom outlet, or in a tank fitted with a closed coil and provided with a draw-off at bottom; at the expiration of 20 minutes to one hour, depending upon the weather, the juice will separate from the solid matter, ordinarily about 25 per cent. of the total bulk, when it is to be drawn off. Turn on steam, bring to a boil, "killing" the foam by adding a small quantity of lard or other sweet grease, and cook 20 minutes, or until the pulp "grains" (that is, when a small quantity is placed on a wooden surface, instead of spreading and presenting a uniformly smooth, watery appearance, it is disposed to gather in a granular mass from which the clear juice "weeps"); then turn off steam; 100 gals. of the average pulp as it comes from the machine will make about 66 gals. sweet pulp of the proper body, or about 50 gals. of finished catsup. For each 50 gals. of "grained" pulp add 6 lbs. salt and 12 oz. benzoate of soda; mix thoroughly and draw off into barrels while still hot. Or run into 5 gal. cans without the preservative.

Uncharred whiskey barrels or barrels of similar nature are best suited for use as containers. Never use a barrel which has been charred; no matter how thoroughly cleaned, some of the charcoal is sure to become mixed with the pulp, and black spots will show in the finished goods. The barrel must be newly coopered and shortly before using must be washed and then steamed for not less than 20 minutes; if it has been previously used for either pulp or catsup, it must also be rinsed with Antimould, or a sulphur strip burned therein. After filling in barrels, store while still hot in cellar or warehouse, bung up. If the process has been properly conducted and there are no defective barrels, there will be no fermentation and consequently no swells.

After being stored while hot, if possible, pulp should never be moved until wanted to put in kettle. When moved, the germs and mould, which form on the top, become mixed in the body of the pulp and are likely to cause fermentation. If shipped from factory to a catsup manufacturer, the barrels when received should be stood on end, and on the first sign of fermentation bore a half-inch hole through head and cover with water level with end of the staves.

When hot tomato pulp is stored in barrels, much of the natural color is destroyed by the long-continued secondary cook. Much of this color may be retained by cooling the pulp to a temperature of 55 degrees or less before running in the barrels.

Do not use skins and cores to make pulp, as the Pure Food Law will condemn it unless all rotten parts, sour scalds, stems, etc., are carefully picked out before pulping. Better throw away the waste and make the skinners be careful not to waste the fruit when peeling. This will save you money and make better goods.

TOMATO PULP, CONCENTRATED OR BOILED DOWN.

Carefully wash (being sure that the washing is sufficient to remove all sand and dirt which collect in the stem end, particularly after heavy rains) sound, dead-ripe tomatoes, and scald thoroughly. Run through pulper and immediately place in jacketed copper kettles, or in wood tanks fitted with closed coils; turn on a full head of steam, "killing" the foam with grease, if necessary; cook rapidly as possible until bulk is reduced one-third, or until the pulp grains; turn off steam. and for each 50 gals. add 6 lbs. salt or more, if the finished catsup or soup formulae will allow, and dissolve; run immediately into 5-gal. square cans, cap and tip at once. No process is necessary if the pulp is rapidly handled; as soon as sealed, place in cooling bath. This pulp is suitable for the highest grade of soups, catsups, sauces and baked beans.

Tomato pulp may be kept in cold storage in barrels, without the use of preservatives. Arrange a tank with brine coils, run the pulp in from the kettle and cool to 38 or 40 degrees; then place in barrels and store at same temperature.

Note 1.—In order to secure the best results in natural color and flavor, not less than 60 lbs. steam pressure should be used in jacketed kettles and not less than 80 pounds pressure when coils are employed. Never reduce tomato pulp on a falling steam pressure.

Note 2.—Instead of "killing" the foam with grease, the better plan is to just cover the jacket with pulp, turn on a full head of steam and bring to a quick boil; with 60 lbs. steam pressure, the violent ebullition will hold foam down; when foam has subsided, open valve of supply pipe and run fresh pulp in so slowly as not to break boil, until the kettle is sufficiently charged.

TOMATO PULP FOR MEDIUM GRADE GOODS.

Wash and scald the tomatoes, place in a tank containing a 2-inch valve and a 6-inch valve at bottom, and provided with a perforated cross or coil; turn on steam and open 2-inch valve; when the tomatoes have sunk to three-quarters of their bulk, shut off steam and close 2-inch valve; then draw off tomatoes through 6-inch pipe and run through pulper; place the resulting pulp in kettle, give a 10-minutes' boil, then place in barrels or cans. This pulp is used for medium grade goods.

TOMATO JUICE, CONDENSED FOR HIGH GRADE GOODS.

Strain the juice from packing tables, packing machines, etc., to remove all coarse particles and seeds; place in jacketed copper kettles, bring to a boil and rapidly reduce to one-third its bulk; add salt in proportion of 6 lbs. to 50 gals., place in 5 gal. cans, cap, tip and process 10 minutes at 212 degrees.

This is used for increasing the flavor of high-grade preparations and for making clear tomato soup.

TURNIPS.

This article is packed to a limited extent, and may be classed among the specialties.

The formula given below is for the yellow variety of turnip, sometimes called the "rutabaga."

Wash and pare yellow turnips, cut in pieces, place in kettle, cover with cold water, bring to a boil and cook 30 minutes; drain off water, pass turnips through pulper. For each 100 lbs. of the pulp, add 2 lbs. salt and ¼ lb. ground white pepper; mix and place in cans while still hot, cap, tip and process No. 2 cans 20 minutes at 240 degrees.

TURNIP TOPS.

Cut off stems and wash well to remove all grit; crisp in cold water, blanch 2 minutes in boiling water, place in cans and hot dip in brine (Salt, 2 lbs.; Water, 12½ gals.). Cap, tip and process No. 2 cans 20 minutes at 240 degrees.

If you don't know where to buy what you need, such as machinery, supplies, picking crates, thermometers, etc., read THE CANNING TRADE, Baltimore, for a list of reliable sellers.

FRUITS

U. S. Food Standard is:

Canned fruit is the sound product made by sterilizing clean, sound, properly matured and prepared fresh fruit, by heating, with or without sugar (sucrose) and spices and keeping in suitable, clean, hermetically sealed containers and conforms in name to the fruit used in its preparation.

There is a constantly increasing demand for fine fruit packed in heavy syrup in small cans. Canners in many sections will do well to pay more attention to this line; select the choicest fruits for this purpose and pack the inferior in No. 10 cans, in water, for the use of large hotels, bakers and preservers.

The process times given are for fruits in their best condition for packing; for immature fruit slightly increase the time; for overripe, slightly decrease the time.

Immature fruit will present a more attractive appearance when cans are cut, but will lack flavor.

Under the title of Small Fruits come the entire line of berries, ranging from the strawberry, which is about the earliest of all fruits in this line, to the blackberry, cherry, currant, etc. The packing of this line varies in the time of the year, according to the section of the country, for there is no special section laying claim to them, as they are packed in almost every State in the Union and Canada.

The small fruit line of canned foods is one which might be easily increased, and should be immensely popular, but to secure both these conditions, for one is dependent upon the other, care has to be taken with the packing. There is no more acceptable food product to the masses of the people; but, unfortunately, some years ago, packers slighted this line, packing the berries in the poorest style, with very little fruit in the can and much water. Not all were so packed, but the infection seemed to spread with remarkable rapidity, and few were free from it. The effect of this lack of attention was that small fruits fell into disrepute, were shunned by the public, and, consequently, the market went far below cost. In fact, they were for a while a drug upon the market, and it has only been in the last few years that they have gradually recovered from this setback. In these last few years packers have given them more attention, have packed them with more care, and

as a consequence have obtained better prices and the demand is on the increase. If packers would but increase the quality of these goods, they would find the demand more than keep pace with their efforts, a consummation devoutedly wished for.

SUGAR SYRUP.

Depending on the density, boiling hot solutions of sugar are 1 degree to 4 degrees lighter in weight than the density of the same solution at 60 degrees Fahrenheit.

The following table gives the approximate amount of sugar in one gallon of syrup at 60 degrees Fahrenheit.

Deg. Beaume	Sugar	Deg. Beaume	Sugar
15 deg.	2½ lbs.	28 deg.	5¼ lbs.
16 deg.	2⅝ lbs.	29 deg.	5½ lbs.
17 deg.	2⅞ lbs.	30 deg.	5⅝ lbs.
18 deg.	3 lbs.	31 deg.	6 lbs.
19 deg.	3¼ lbs.	32 deg.	6¼ lbs.
20 deg.	3½ lbs.	33 deg.	6½ lbs.
21 deg.	3⅝ lbs.	34 deg.	6¾ lbs.
22 deg.	3⅞ lbs.	35 deg.	7 lbs.
23 deg.	4 lbs.	36 deg.	7¼ lbs.
24 deg.	4¼ lbs.	37 deg.	7½ lbs.
25 deg.	4½ lbs.	38 deg.	7⅞ lbs.
26 deg.	4¾ lbs.	39 deg.	8⅛ lbs.
27 deg.	5 lbs.	40 deg.	8½ lbs.

In all cases a Saccharometer should be used to accurately test the degrees of syrups.

GRADES OF CALIFORNIA CANNED FRUITS.

Following are the grades of canned fruits recognized by California canners, most of whom make them the minimum, while several make a higher standard for the same grades.

Apricots—Extra 3's—Eight to the pound and larger, ripe, firm and well colored, free from rust, scale and all imperfections; fruit uniform in size and texture, not over 24 pieces in each can, carefully packed, 28 ounces, including can.

Extra 2½'s—Same as 3's, slightly smaller fruit, not over 24 pieces in each can, 25 ounces, including can.

Extra Standard—Ten to eight to the pound, ripe, firm, well colored, clean and uniform in size, not over 28 pieces in each can, 25 ounces, including can.

Standard—Twelve to ten to the pound, same quality as extra standard, fairly clean, uniform in size, not over 36 pieces to each can, 25 ounces, including can.

Second—Smaller than twelve to the pound, fairly firm and clean fruit, not good enough for standards, 25 ounces, including can.

Water—Same as seconds unless otherwise specified, 25 ounces, including can.

Pie—Soft and imperfect fruit.

Peaches—Free and Cling—Extra 3's—Worked from 2½ inch and up, to peel out not less than 2⅜ inches, ripe, firm fruit, nicely peeled and worked, uniform in size and texture, with careful work in canning, 8 to 12 pieces in each can, 28 ounces, including can.

Extra Standard—Worked from 2⅜ inch to 2½ inch peaches, to peel out not less than 2¼ inch, good work in peeling and canning, ripe, firm fruit, uniform in size, 12 to 14 pieces in each can, 25 ounces, including can.

Standard—2¼ inch to 2⅜ inch peaches, to peel out not less than 2⅛ inches, same quality and work as extra standard, 14 to 16 pieces to each can, 25 ounces, including can.

Second—Fruit not large enough for standards, fairly firm and worked, 25 ounces, including can.

Water—Fruit not large enough for seconds, good-sized pieces, not necessarily halves, unless specified as seconds or standards in water when you use grade specified, 25 ounces, including can.

Pie—Peeled, soft and broken pieces, unpeeled, small and overripe fruit.

Black Cherries—Extra 3's—Not less than 1 inch in diameter, clean and free from blemishes of all kinds; care taken not to bruise in sorting and canning, fruit uniform in size and color, 28 ounces, including can.

Extra 2½'s—Same as extra 3's, slightly smaller, 25 ounces, including can.

Extra Standard—⅞ inch to 1 inch diameter, must be sound, clean and free from blemishes, 25 ounces, including can.

Standard—¾ inch to ⅞ inch diameter, sound, clean and fairly free from blemishes, 25 ounces, including can.

Second—Less than ¾ inch in diameter, fairly clean and sound, 25 ounces, including can.

Water Same as seconds, 25 ounces, including can.

Pie—All fruits not suitable for other grades.

Bartlett Pears—Extra 3's—Worked from 2⅝ inch and up, pare and peel out not less than 2½ inches, evenly and nicely peeled so as to keep natural shape of pear, free from worms and well cored, care taken in packing the cans, uniform size, fruit to be ripe and firm, 7 to 9 pieces in each can, 27 ounces, including can.

Extra 2½'s—Same as extra 3's, slightly smaller, 7 to 9 pieces in each can, 24 ounces, including can.

Extra Standard—2½'s, pears to peel out not less than 2⅜ inches, evenly and nicely peeled to keep shape of pear, well cored, care taken in packing, uniform size, fruit to be ripe and firm, 9 to 10 pieces in each can, 24 ounces, including can.

Second—2¼ inch pears and less, ripe, fairly peeled and cored, 12 to 14 pieces in each can, 24 ounces, including can.

Water—Fruit not suitable for table grades and too good for pie.

Pie—All soft, broken and inferior fruit.

All other fruit, as a rule, to be assorted in five grades. The largest and best to be used in packing the 3's and 2½ extras; 2½'s extra, slightly smaller than 3's, always to be ripe, firm, clean and perfectly free from blemishes, the greatest care taken in working and canning, and at all times uniform in size and texture.

The second size or next to the largest, to be used for the extra standard grade, to be ripe, firm, clean and free from blemishes, uniform in size and texture.

The third size to be packed in standards, to be ripe, firm and fairly clean and free from blemishes, uniform in each can.

The fourth size, to be used as seconds or water.

All inferior fruit, such as may be too soft, cracked or with other blemishes that make it unsuitable for the other grades, irrespective of size, will constitute the fifth grade and shall be used for pie.

APPLES.

The first in this line, apples, is an article of much importance, and has in late years grown to be a large pack and in great popular demand. But as great as it is there is a splendid opportunity to immensely increase the consumption of it in the canned shape. That it is popular with the masses goes without saying, but it is a fact that probably not 50 per cent. of the people of the United States know that they can purchase apples in cans. If all the housewives of the country knew that they could purchase apples ready for use, without the waste of peeling, cores, specks, etc., as in the green fruit, and at an actual saving, the consumption and, consequently, the demand would greatly increase.

Use "picked" apples and do not mix the varieties.

Firm, tart varieties of apples are best for canning. Peel, core and cut out all decayed and discolored portions; halve or quarter, according to size of fruit; drop immediately in a 2% salt bath; this prevents the brown discoloration of the surface. Remove from the bath, wash thoroughly in running cold water, place in cans, fill with boiling water, cap, tip and process No. 3 cans 3 minutes at 240 degrees, or 8 minutes at 212 degrees; No. 10 cans 6 minutes at 240 degrees or 10 minutes at 212 degrees.

APPLES, WHOLE FOR DUMPLINGS.

Select tart apples, rather underripe, of desired size; peel and core; wash thoroughly in running cold water; blanch 1 minute in a bath containing ½ lb. salt to 12½ gallons water; pack in cans, hot dip in water, cap, tip and process No. 3 cans 3 minutes at 240 degrees, 8 minutes at 212 degrees; No. 10 cans 6 minutes at 240 degrees, 15 minutes at 212 degrees.

APRICOTS.

Apricots are packed almost exclusively in California, and generally in No. 2½ cans. They are carefully sorted as to size; generally not peeled, but are wiped, either by hand or machine; halved and pitted. Syrup slightly lighter than for peaches is used, put on hot, the cans exhausted 3 minutes, sealed and processed for 25 minutes at 212.

BLACKBERRIES.

This fruit is usually packed in No. 2 or No. 10 cans, is wholesome and in good repute in every section of the country; and if it is packed in good style, demand could easily be greatly increased. The preserved article meets with quite a good demand, and, as it could be canned so as to sell at a lower price than the preserved in glass, it is reasonable to suppose a large trade could be worked up on them; but this will all depend upon the quality of the goods and the perseverance with which this quality is maintained.

We would advocate a rather better quality than that set down as the standard of the Canned Goods Exchange, which is: "Cans to cut out not less than two-thirds full after draining, fruit to be sound, put up in water," suggesting that instead of being put up in water, they be packed in not less than 20 degrees cane sugar syrup. In other words, to make them suitable for home consumption as they come from the can, without further treatment, and the cans must be full.

STANDARDS.

Stem and clean; if any sand or grit, remove by washing, but do not wash unless absolutely necessary; place in cans, fill with hot syrup, cap, tip and process.

No. 2 cans, 3 minutes at 240 degrees; 8 minutes at 212 degrees.

The inferior fruit may be packed in No. 10 cans, as pie stock following the above directions, filling with hot water instead of syrup. No. 10 cans, 8 minutes at 240 degrees; 22 minutes at 212 degrees.

EXTRA FANCY OR PRESERVED.

Select fine, cultivated fruit of moderate size and not overripe.

Place 3 pounds of fruit and 3 pounds of granulated sugar in suitable vessels and allow to remain, giving them an occasional stirring until the juice of the fruit dissolves the sugar. Then place in cans, cap and exhaust 5 minutes, tip and process No. 2 cans 3 minutes at 240 degrees, or 8 minutes at 212 degrees.

This style of goods will compete successfully with the preserved in glass, and, if honesty counts for anything in this world, should be profitable to the packer.

The juice which drains from the packing table may be utilized for jelly, fruit syrup or for wine or cordial, provided cleanliness and neatness are observed in handling the pack.

BLUEBERRIES.

Clean from sticks, stems and green fruit, place in cans and fill with boiling water, or fill with cold water and exhaust to 160 degrees, cap, tip and process.

No. 10 Cans, 25 minutes at 212 degrees.

If packed in plain tin cans give not more than 6 months guarantee. If packed in enamel lined cans or inside lacquered cans, one year.

RED CHERRIES.

Stem the cherries, pick out all leaves, place in cans, fill with hot water, cap, tip and process, for pie stock:

No. 2 Cans, 3 minutes at 240 degrees: 8 minutes at 212 degrees. No. 10 Cans, 8 minutes at 240 degrees: 22 minutes at 212 degrees.

When unpitted canned cherries are carried over from season to season, they are apt to develop without apparent reason what may be termed "spring swelling" at a certain period of the year.

When this is detected by the springing of the cans, reprocess No. 2 cans 12 minutes at 212 degrees and No. 10 cans 30 minutes at 212 degrees.

RED CHERRIES, PITTED.

Stem the cherries, remove all leaves, pit by any appropriate method, place in cans, fill with hot water or syrup of the desired density. Cap, tip and process No. 2 cans 4 minutes at 240 degrees, or 12 minutes at 212 degrees; No. 10 cans 12 minutes at 240 degrees, or 30 minutes at 212 degrees.

Most hand and power seeders will tear and mutilate cherries to a greater or less extent, and, when the price obtained for the finished goods will allow it, it is best to seed by hand. This is easily accomplished by first steming the cherry, then force the seed out through the stem opening by gentle pressure of the thumb and forefinger on the pointed side of the seed. When it is desired to have the fruit retain its shape, the seed may be ejected through the

stem hole by employing for the purpose a copper needle set in a handle. By proper manipulation the cherry will be but slightly torn and show but a minute puncture where the needle enters on opposite end.

Cherries to be packed in cordial must be seeded in this manner.

Where a comparatively large quantity of cherries are to be pitted, though not enough to warrant the purchase of a power machine, it is advised that a series of small rotary hand seeders be provided, with a grooved wheel in place of the crank, and fastened securely to a substantial table carrying a shaft, either above or beneath, fitted with grooved pulleys for round driving belts to connect with the seeders. This is a fairly rapid and economical apparatus and will give satisfactory results where the tearing of the fruit is not too objectionable.

WHITE WAX CHERRIES.

Handle and process the same as red cherries, rejecting all discolored and bruised fruit.

CRANBERRIES.

Pick out the defective berries, wash in cold water, place in cans, fill with hot water; cap, tip and process No. 10 cans 12 minutes at 240 degrees.

CURRANTS.

This fruit, like gooseberries, is one of the limited articles of packing. It is generally used in the making of preserves, and consequently there is not much demand for the canned article.

CURRANTS, RED.

Red currants are packed very much like gooseberries.

Stem and clean, place in cans and fill with hot water or syrup, cap, tip and process.

No. 2 Cans, 3 minutes at 240 degrees; 10 minutes at 212 degrees.

No. 10 Cans, 9 minutes at 240 degrees; 25 minutes at 212 degrees.

FIGS—No. 1.

Clean the figs, wash in cold water, blanch five minutes in boiling water, place in cans, fill with boiling water, or syrup of desired density, cap, tip and process at 212 degrees No. 3 cans 30 minutes, No. 10 cans 70 minutes.

FIGS—No. 2.

Dry clean the figs and soak 12 hours in 8 per cent. brine (8 pounds of salt to 12½ gallons water), remove and wash in cold water, place in cans, then proceed same as previous process.

FRUIT PULPS FOR MARMALADE (ENGLISH STYLE JAM).

Prepare the fruit and place in jacketed kettle, with 5 per cent. of water for juicy and 10 per cent. of water for dry fruits; turn on steam, bring slowly to a boil and cook 5 minutes, stirring occasionally; place in No. 10 cans, cap, tip and process 15 minutes at 240 degrees, or 30 minutes at 212 degrees. After processing drop in cooling bath.

GOOSEBERRIES.

This article is mainly, if not entirely used by pie makers. It is put up by packers generally with this idea in view, and, while these pie foundries create a considerable demand, to which must be added a small demand for home consumption, still a great pack of it could not be disposed of.

The Standard of the Baltimore Canned Goods Exchange reads: "Cans to cut out not less than two-thirds full after draining, fruit unripe and uncapped; put up in water."

Run the fruit through a dried fruit cleaner, or through a fan-mill fitted with a medium sieve; wash in cold water, place in cans, fill with hot water, cap, tip and process.

No. 2 Cans, 5 minutes at 240 degrees; 14 minutes at 212 degrees.

No. 10 Cans, 14 minutes at 240 degrees; 40 minutes at 212 degrees.

GOOSEBERRIES, RIPE.

Wash the fruit to remove all chaff and stems, place in cans, fill with hot water, cap, tip and process.

No. 2 Cans, 4 minutes at 240 degrees; 12 minutes at 212 degrees.

No. 10 Cans, 12 minutes at 240 degrees; 35 minutes at 212 degrees.

GRAPES.

Grade, steam and place in cans, fill with hot syrup, seal and process No. 2½ cans 15 minutes at 212 degrees.

MOLASSES.

Neither Sorghum, Molasses or any admixture of them, either with or without Glucose, require sterilization in the can after sealing, but the goods must be placed in the can at a temperature of not less than 160 degrees and must be not less than that when cans are capped. In order to be sure of this, and for sanitary reasons, it is best to wash the cans with boiling water, or subject to a steam bath, before filling. The slip cover has proven satisfactory with this class of goods.

PEACHES.

To handle peaches successfully requires a considerable force of hands and much capital, for while there are machines to do the peeling, the general custom is to secure a large number of hands, who peel the fruit and remove the stones. The peelers are arranged along tables, much in the same manner as is done for tomatoes, but constant care and attention are required in order that the peeling is done properly. To turn out fine fruit, the peeling must be smooth and not too deep, and then, if the fruit is not handled rapidly, it will turn brown, taking on a rusty appearance. It is claimed this discoloration may be removed by blanching the fruit a few minutes in boiling water, and, if the process is done properly, all appearance of it will have disappeared in the finished article.

PEELER SYSTEM.

The New Process Peach Peeling Machine is used very successfully in California, and its use is extending over the country, a number of these machines now being in use. They peel the peaches better, faster, more cleanly, and effect a great saving in fruit.

Peaches are packed in every style of can from No. 1 to the No. 10, but these cans should be provided with extra large openings, known as "peach holes," from the necessity of having a large enough filling space to pass the halved peaches into the can without breaking or cutting the fruit. Because of this requirement, the makers of sanitary cans claim a great advantage for their style of can, as the top is entirely open, and the can may be filled to its entire circumference, the tops being placed on afterwards.

The various degrees of syrup are given in another part of this Complete Course, and should be referred to when required.

PEACHES, STANDARD.

The Standard of the Baltimore Canned Goods Exchange is as follows: "Cans full, fruit good size, evenly pared, cut in half pieces, put up in not less than ten degrees cold can sugar syrup."

Use nearly ripe, unbruised fruit, cut in halves, remove seed, employing a pitting spoon if peaches are soft, pare smoothly and evenly with a sharp, thin-bladed knife; place in cans, fill with hot syrup, cap, tip and process:

No. 1 Cans, exhaust 1½ minutes and process 15 minutes at 212 degrees.

No. 2½ Cans, exhaust 3 minutes, process 20 minutes at 212 degrees.

No. 3 cans, exhaust 3 minutes, process 20 minutes at 212 degrees.

No. 10 Cans, exhaust 5 minutes, process 35 minutes at 212 degrees.

The above is for standard grade. Extras or seconds are picked in the same way, the difference being in the quality of fruit and syrup used, and a slight variation in the time.

PIE PEACHES.

The Standard of the Baltimore Canned Goods Exchange calls for: "Cans full, fruit sound, unpared, cut in half pieces, put up in water."

Use inferior fruit, not suitable for standard or the better grades, wash in cold water, separate the hard and the soft fruit, cut in halves, remove seed, pack in cans, fill with hot water, cap, tip and process No. 10 cans.

Hard fruit, exhaust 5 minutes and process 35 minutes at 212 degrees.

Soft fruit, exhaust 4 minutes and process 30 minutes at 212 degrees.

PEACHES, DRY PACKED OR SLICED.

Select yellow peaches, rather underripe, halve, remove seed, pare, cut in small sections suitable for table use; mix with 20 per cent. of finely granulated rock candy, place in No. 1 cans, shaking down the mixture and settling as tighty as possible without mashing, cap and exhaust in steam box; No. 1 Cans, 8 minutes; No. 2 Cans 10 minutes: Process:

No. 1 Cans, 15 minutes at 212 degrees.

No. 2½ Cans, 20 minutes at 212 degrees.

PEACHES, EXTRA FANCY, WHOLE.

Select large, perfect peaches, just slightly underripe, remove the seed with a pitting spoon, dip momentarily in boiling hot water; rub or pull off the skin; pack carefully in cans, stem end up; fill with 42 degrees boiling hot syrup; cap, tip and process.

No. 2 Cans, 15 minutes at 212 degrees.

No. 3 Cans, 20 minutes at 212 degrees.

If desired, the syrup may be flavored by a portion of the seed. For a 50-gallon batch, take ½ lb. of seed, crush with a hammer, tie in a cheesecloth bag and cook with the syrup.

PEARS (KIEFER OR OTHER HARD VARIETIES).

Pare and cut in quarters, remove core and seed, place in cans, hot dip in water or light syrup, cap, tip and process No. 2 cans 10 minutes at 240 degrees, or 20 minutes at 212 degrees; No. 3 cans 12 minutes at 240 degrees, or 25 minutes at 212 degrees; No. 10 cans 20 minutes at 240 degrees, or 35 minutes at 212 degrees.

PEARS (BARTLETTS OR OTHER SOFT VARIETIES).

Peel and cut in halves, leaving stem on one side; remove seed and core if desired; throw in bath containing 1 ounce sulphite soda in 5 gallons water; remove from bath and wash in cold water; blanch 1 minute in boiling water, place in cans, hot dip in water or syrup; cap, tip and process for same time as hard pears in quarters.

PEARS, FOR WEISBADEN PROCESS.

Select slightly underripe, fine large Bartletts, peel smoothly and carefully, scrape the green skin from stem, halve the fruit, leaving the entire stem on one-half of the pear; throw immediately in sulphite of soda bath; when a sufficient quantity has been prepared remove from bath, wash in cold water and subject to sulphur fumes for six hours; then remove, wash well in running cold water, place in cans, hot dip in heavy syrup, cap, tip and process No. 2 cans 8 minutes at 240 degrees, or 12 minutes at 212 degrees; No. 3 cans 10 minutes at 240 degrees, or 15 minutes at 212 degrees.

PINEAPPLE.

This is an article that is gaining in popularity every year. It is, perhaps, the steadiest article in price on the market, but because of the expense in handling, the care required, and the difficulty of the average packer securing a supply, it cannot be considered as an article of general packing. Some years ago its packing was almost entirely confined to Baltimore, though considerable was packed in the West India Islands. Recently, however, packers in various sections of the country have taken it up, having their supplies sent in carloads from Baltimore or New York.

HAWAIIAN PINEAPPLE.

In the past three years the Hawaiian Islands have come to the front as the producers of the finest pineapple in cans. This pineapple is not white in color, but tinted yellow, is tender and full of the real pineapple flavor, a condition that is brought about through the fact that the fruit is allowed to ripen on the plant, and is then canned. In addition the packers have well advertised their goods, and now have the market.

The introduction of machinery into the operation of packing pineapples, as in every other article of canned foods, has greatly facilitated its handling. In fact, it is practically impossible to profitably handle it without this machinery, and this must be taken into consideration.

Pineapple is packed in almost every style of tin cans, from the small No. 1 lunch size to the No. 10; and the variety of styles in which it is presented vary as greatly as the sizes of the cans.

The standard of the Baltimore Canned Goods Exchange is: "Cans full, fruit sound and carefully pared, slices laid in evenly, put up in not less than 10 per cent. of cold cane sugar syrup."

When pineapples are received, assort and carefully separate the ripe fruit, ripe specks, green and green specks. Handle as gently as possible to avoid bruising, as all bruised places will speck in a very short time. Work up the ripe specked fruit first, following with the ripe fruit next, unless the quantity of specks is such that the ripe fruit is likely to speck before this can be accomplished. After handling these, use the green specks, then the green ones as they ripen. If space allows, store the green pines on floor, butt-end down in single layer, so that as they age the ripe ones may be removed without disturbing the unripe fruit. When space will not allow separating them in this manner, do not pile more than eighteen inches deep; sort the pile over every day and remove all ripe and specked ones.

When peeling by hand, first square the butt with a sharp knife and twist out top; place pine butt down on a table and with a drawing sweep of the knife slice off the outside skin, making cut deep enough to reach about half way to bottom of the eye, then trim off the circle of skin left on top and bottom. This first peeling is of little use and may go to the refuse heap.

Then make a second peeling in the same manner, cutting deep enough to remove the eyes on the pine, in which case it may be removed by the pincer-like implements intended for this purpose.

When peeling with a rotary machine, arrange back of the knife shaft a double spout with a valve or shutter at the top, to be worked with a foot treadle, arranged in such a manner that the first peelings may be ejected through one spout and the second peelings through the other. This will save the time and trouble of changing the pines from one machine to the other in separating the first and second peelings. The juice from the first peelings may be expressed and used to replace water in making syrup for extra and fancy goods. The second peelings are used for seconds, grated or pie grade.

SETTING UP MACHINES.

Referring to plan of power factory, place two peeling machines in 280 and 92—three sizing machines (one each 2¾ inches. 3 inches and 3⅛ inches) in 269—81—93; three coring machines in 270—82—94; one slicing machine in 283; one corecutter in 295. and two saw grinders in 285—97. Packing tables to occupy space bounded by 194, 202, 254, 262. Arrange suitable shoots so that pines may be readily transferred from one line of machine to the other.

Reserve the middle portion of the ripest. largest and soundest fruit for extra sliced, the medium and small pines and the end slices of the larger pines for standard and the entire slices of the

sound portion of the specked for seconds. The trimmings left by the sizing machines are the choicest part of the pines and, depending on the amount of sugar used, may be graded as fancy or extra standard grated. The imperfect top and bottom slices of small pines when grated grade as standard. The second peeling and small pieces of the sound portion of specked fruits are packed in water and classed as pie fruit. Cut the cores in ¾ inches to 1 inch lengths and pack in water for confectioners' use.

After paring, sizing and coring, run through the slicer, which may be adjusted as your trade demands to cut in thickness from ⅛ inch to ½ inch for confectioners' use for crystallizing, etc. Note that thick slices for confectioners should not be cored; if cored when subjected to the action of concentrated syrups used in crystallizing the end of the fibres in core hole will swell and make the finished slice present an unsightly appearance.

Place the slices in a perforated copper bucket or willow basket and plunge momentarily in boiling water, then in cold water; turn out on packing table, assort according to diameter of slices and pack in cans, either counting the slices or weighing out the required amount for each can. Fill the cans with hot water or syrup of the desired density, cap, tip and process.

No. ½ cans, 6 minutes at 240 deg., or 14 minutes at 212 deg.
No. 1 cans, 7 minutes at 240 deg., or 18 minutes at 212 deg.
No. 2 cans, 8 minutes at 240 deg., or 20 minutes at 212 deg.
No. 3 cans, 10 minutes at 240 deg., or 25 minutes at 212 deg.
No. 10 cans, 30 minutes at 240 deg., or 40 minutes at 212 deg.

EXTRA GRATED.

Extra grated pineapple must be eyeless and coreless. Standard grated must contain but few specks.

Place the grated pine suitable for these grades in a jacketed copper kettle, add the desired amount of sugar, bring to a boil and stir until sugar is dissolved; fill in cans hot.

PIES.

For pie grade, place in kettle, add sufficient water to make it handle readily, bring to a boil; fill in cans hot.

Cap, tip and process same time as slices, though No. 10's packed in water, either sliced or grated, may be processed 5 minutes less than syruped goods.

PINEAPPLES, DRY-PACKED.

Pare, remove all eyes and core; cut in dice ¾ inch square; roll in granulated Rock Candy; pack closely in cans; fill all crevices with granulated sugar, cap and exhaust No. 2 cans 10 minutes in steam box, tip and process 10 minutes at 240 degrees or 20 minutes at 212 degrees. Slices may be packed same way.

WHOLE PINEAPPLE.

Pare, core and remove all eyes from fruit which will fit cans without passing through sizing machine; place in sanitary cans, fill with hot 35-degree syrup, seal and process:

No. 2 cans, 12 minutes at 240 degrees.
No. 3 cans, 15 minutes at 240 degrees.

If sanitary cans are not procurable, place pine in an ordinary can before top is soldered on, covering top of pine with a circle of parchment paper, snap on top and float in joker as quickly as possible; remove the paper through the cap hole, then proceed as above.

All machines used in handling pineapples should be washed up during the noon shutdown; at night, after washing up, all the iron surfaces coming in contact with the pines should receive a thin coating of petrolatum or some similar substance.

PLUMS.

Green gage, yellow egg and Lombard are generally used, though other varieties may be. Wash, pack in cans with desired degree of hot syrup, exhaust and process; No. 2½ cans, 14 minutes at 212 degrees; No. 3 cans, 16 minutes at 212 degrees; No. 10 cans. 30 minutes at 212 degrees, for plums with small seeds. Those with large seeds must be given 5 minutes longer on smaller sizes of cans, and 10 minutes longer on No. 10's.

QUINCES.

Pare, core and cut in quarters or eights, drop in salt bath (½ lb. to 5 gallons water), remove and wash in cold water, place in cans, hot dip in syrup or water, cap, tip and process No. 2 cans 6 minutes at 240 degrees, or 15 minutes at 212 degrees.

When quinces are intended for use only in preserves or jams, pare, core and cut in small pieces or cubes, throw in salt bath as above, remove and place in jacketed kettle, cover with cold water and bring, very slowly, just to a boil; then drain off water, place in No. 10 cans, hot dip in water, cap, tip and process 14 minutes at 240 degrees, or 30 minutes at 212 degrees.

RASPBERRIES.

This berry is usually packed in No. 2 cans, though a considerable quantity is put up in No. 10 cans for bakers' purposes. In the red variety, especially, this fruit is so expensive in its fresh state that the packing of it, other than as preserved goods to sell at high prices, is almost prohibitive, and the amount packed is usually quite small.. For this reason many consider red raspberries in the light of a stock suitable for preserving in glass, etc., but beyond the canners' reach.

The black variety may be obtained at comparatively low prices and in good quantity, and is, therefore, better adapted to the canner's use. In sections of the country where this crop is abundant and oftentimes a glut on the market, packers would find it to their advantage to get the fruit into No. 10 cans as pie stock, for which there is nearly always a good demand. Then, again, this class of fruit, put up in water or light syrup, may be worked up during the winter months into preserves, jams, etc., or sold to those manufacturers who work it up.

STANDARD.

The Standard of the Baltimore Canned Goods Exchange is: "Cans to cut out not less than two-thirds full after draining, fruit to be sound, put up in not less than 10 degrees cold cane sugar syrup."

Pick and remove all leaves and refuse; all grit must be removed, but do not wash if avoidable; place in cans, fill with hot syrup of the desired degree; cap, tip and process.

No. 2 Cans, 3 minutes at 240 degrees; 8 minutes at 212 degrees.

No. 10 Cans, 8 minutes at 240 degrees; 22 minutes at 212 degrees.

Raspberries may be processed at a low temperature, treating them the same as strawberries.

EXTRA FANCY OR PRESERVED.

Select the finest fruit, slightly underripe; pick carefully and free from all caps and refuse; place in cans and fill with hot syrup of 42 degrees. Cap, tip and process No. 2 cans, 3 minutes at 240 degrees, or 8 minutes at 212 degrees.

A heavy sugar syrup has the effect of greatly shrinking and hardening raspberries and a better eating article can be produced by cooking the berries in a jacketed kettle with an equal weight of sugar to preserve consistency; then can, cap and process as above.

RASPBERRIES IN WATER.

The culls, soft and inferior fruit may be packed in No. 10 cans in water for preservers' and bakers' uses.

Clean the fruit, place in jacketed kettle, add enough water, about 15 per cent., to make them handle readily; bring to a boil; fill in cans. Cap, tip and process, 8 minutes at 240 degrees or 23 minutes at 212 degrees.

STRAWBERRIES.

The Standard of the Baltimore Canned Goods Exchange is: "Cans to cut out, after draining, not less than half full of fruit, which shall be sound and not of the variety known as seedlings, put up in not less than 10 degrees cold cane sugar syrup."

Cap the berries, separate into two classes, reserving the largest and most perfect fruit for standard and extras, the balance for seconds. Wash in cold water to remove sand in a tub fitted with a sieve, or perforated metal diaphragm, 6 inches above the bottom to retain berries when water is drawn off. Place in cans, when the seconds may be again sorted to remove the very soft, imperfect and torn berries which are fit only for preservers' uses in making jelly and cheap preserves. Fill the cans with hot water or hot syrup of the desired density. Cap, tip and process.

No. 1 Cans, 3 minutes at 240 degrees or 8 minutes at 212 degrees.

No. 2 Cans, 4 minutes at 240 degrees or 10 minutes at 212 degrees.

No. 10 Cans, 8 minutes at 240 degrees or 22 minutes at 212 degrees.

Under no circumstances should the syrup be thickened with glucose. This combination will almost invariably generate a disagreeable odor and taste, particularly so if contaminated with the least particle of flux, and will be rendered unfit for sale and for consumption. Where the pure food laws do not prohibit the use of artificial coloring, the appearance of the goods will be improved by tinting the syrup with any of the "Certified" non-poisonous colors offered for this purpose by responsible parties, but this is not necessary, for the natural color of the berries will be nearly all retained if cans are sterilized at 180 degrees instead of processing at 212 degrees or above. If a color is used it must be stated on the label.

Sterilization at this temperature may be accomplished in an open kettle, if sufficient care is exercised. Fill the cans with selected fruit, then with syrup at a temperature of not more than 200 degrees; cap and tip; place in kettle and fill with cold or cool water: turn on steam and bring very slowly to 180 degrees; then cut steam and maintain between 175 degrees and 180 degrees; 60 minutes for No. 1 cans, 75 minutes for No. 2 cans; then remove from bath and cool. Sterilization at this temperature may be done in retorts connected with a condenser and pump, the same as used with vacuum pans; from time to time as the water evaporates supply sufficient of like temperature to keep the cans entirely covered.

PRESERVED (CANNED) STRAWBERRIES.

To make the finest quality of canned strawberries, such as are branded "Preserves," pick sound, ripe berries, wash, add an equal weight of sugar to the fruit, place in crocks or other suitable containers in small lots of not more than six pounds each: stir occasionally until the juice of the fruit dissolves the sugar, then place in cans. cap. Exhaust No. 1 cans for four minutes, tip and process three minutes at 240 degrees, or eight minutes at 212 degrees; or better. exhaust 10 minutes at 180 degrees, tip and sterilize 60 minutes at 180 degrees.

MEATS

Packers of fruits and vegetables, wishing to establish a winter pack, and who are so situated as to be able to procure supplies of poultry, game, etc., at reasonable prices, may be able to include these items in their line.

Of course, it is understood that the small canner cannot compete with the great meat packing establishments in heavy lines, such as corned beef, but there is a certain demand for high grade specialties which he may supply at a profit.

All raw stock must be in good condition when packed; no amount of manipulation or processing will make bad meat good; high spicing may cover the putrid odor and taste, but will not insure the consumer against ptomaine poisoning, nor prevent prosecution under the food law.

As far as possible, pack meats in cans while hot, and process without exhausting. If packed cold, cap, tip and give one-half the process, then vent cans, reseal, and give remainder of process. Process temperature for all kinds of flesh is 250 degrees F.

The preliminary cooking in water may be done either in jacketed kettles, or tanks containing closed copper coils. Provide and use, unless otherwise directed, tight-fitting covers for same. Do not throw meat loose in vessel, but pack in a covered wire crate made of tinned iron, or, if not too expensive, of perforated copper.

Utilize the surplus in which meats are boiled, for soups.

MEAT JELLY.

Place 100 lbs. calves' feet with 12½ gals. water in kettle, and add 2 lbs. sliced onions, 2 lbs. sliced carrots, ¼ lb. each of whole black pepper, celery seed and green pot herbs contained in a muslin bag; turn on steam, bring slowly to a boil and simmer eight hours, adding water to make up loss by evaporation; draw off liquor and strain; when it jells, skim grease from top and return to kettle, adding 1 pint of lemon juice or 1 oz. tartaric acid; turn on steam and heat to 180 degrees. Mix ½ gal. white of egg free from yolk with an equal bulk of water, crush the egg-shells and add thereto; stir this thoroughly in the melted jelly, bring to a boil and strain through a flannel bag previously wet with water. Instead of eggs, blood, or the Isinglass solution given under soups, may be used.

BOILED BEEF.

Select moderately lean beef, cut in can size pieces, allowing 25 per cent. for loss in weight, place in crate and plunge in boiling

water, containing 3 lbs. salt to each 12½ gals. Boil 2½ to 3 hours, hoist out crate and pack meat in cans; fill the cans with jelly made by boiling down 12 gals. of the water in which the meat was cooked to 6 gals. and dissolving therein 1 lb. gelatin, previously soaked in cold water for 1 hour, and adding 2 oz. ground white pepper. Solder on tops, tip and process at 250 degrees, 1 lb. cans 45 minutes, 2 lb. cans 55 minutes, 3 lb. cans 65 minutes, and 5 lb. cans 85 minutes.

CORNED BEEF.

Cut the corned beef to can hole size, place in kettle and cover with cold water, bring slowly to a boil and cook gently one hour, hoist crate from kettle, place beef in cans, packing and ramming solidly, cap, tip and process at 250 degrees, 1 lb. cans 40 minutes, 2 lb. cans 45 minutes, 3 lb. cans 50 minutes, 4 lb. cans 55 minutes, 5 lb. cans 60 minutes, 6 lb. cans 65 minutes, 7 lb. cans 70 minutes, 14 lb. cans 90 minutes.

ROAST BEEF.

Cut the beef in can size pieces, allowing 30 per cent. for shrinkage; wrap the pieces with string and place on end in roasting pan; for a 50 lb. batch, sprinkle on the beef one oz. ground black pepper, and place in the pan 2 quarts water in which has been dissolved ½ lb. salt; place pan in a hot oven and cook 30 minutes for 2 lb. pieces, 40 minutes for 3 lbs.; turn the meat when half the time has expired. and baste to prevent burning; when done, take out the meat and make gravy from a quart of the pan grease and one pint of flour and mix smoothly, then add 2 gals. boiling water, and stir continually until it boils; add ½ lb. salt, 1 oz. ground black pepper, and sufficient caramel to produce a rich brown color. Place the roasted meat in cans, fill with the gravy, solder on lid, tip and process at 250 degrees 1 lb. cans 40 minutes, 2 lb. cans 50 minutes and 3 lb. cans 60 minutes.

BEEF CANNELON.

100 lbs. Beef.
4 doz. Eggs.
½ lb. Green Parsley, chopped fine.
10 lbs. Bread Crumbs.
¼ lb. Powdered Tartaric Acid.
2½ lbs. Salt.
2 oz. Ground Black Pepper.

Trimmings and odd pieces of lean beef are used: cut in small pieces and plunge in a boiling solution of salt 3 lbs., water 12½ gals., cook until moderately well done, then chop fine. Dissolve the acid in a pint of water, separate and beat the eggs, and mix all the ingredients together; pack tightly in 1 lb. flat cans, cap, tip and process 55 minutes at 250 degrees.

PRESSED BEEF.

100 lbs. Beef.
2 lbs. Salt.
½ oz. Ground Cloves.
½ oz. Ground Mace.
1 oz. Ground Cinnamon.
1 oz. Ground Allspice.
4 oz. Black Pepper.
½ oz. Cayenne Pepper.
1½ pints Vinegar.

Place the beef in kettle, cover with cold water, bring to a boil and cook until well done; remove all bones, cut in small pieces, mix with salt and spices, and pack in 1 lb. flat cans.

Reduce the liquor in which the meat was cooked to 2½ gallons, add the vinegar and pour over meat in cans, tip and process 45 minutes at 250 degrees.

BEEF STEW.

100 pounds Beef, cut in small pieces.
15 pounds Sliced Onions.
200 pounds Potatoes, cubed or cut in small pieces.
37½ gallons Water.
2 pounds Soup Herbs.
1 pound Parsley.
4 pounds Salt.
1 pound ordinary Black Pepper.
10 pounds Flour.

Place the beef in kettle and cover with 32½ gallons of the water, turn on steam and bring slowly to a boil; a few minutes after boil commences the scum of the meat will rise to the top; turn off steam and skim this off; tie the soup herbs in a bag and throw in, add the onions, bring to a boil, and simmer three hours; then add the potatoes and salt, and cook ten minutes after it boils; then add the flour mixed with 5 gallons water, bring to a full boil and shut off steam; then add the pepper and the parsley very finely chopped. Pack in 3-pound cans, cap, tip and process 60 minutes at 250 degrees.

ROAST MUTTON.

Handle and process same as Roast Beef, but fill cans with melted meat jelly, to which has been added a little of the pan grease.

CURRIED MUTTON.

100 pounds Boiled Mutton, finely chopped.
50 pounds Rice.
7 pounds Butter.
5 pounds Flour.
2½ pounds Curry Powder.
3 pounds Salt.
6½ gallons Boiling Water.

Wash the rice and drop slowly in 40 gallons boiling water; cook 35 minutes and drain water off. Place butter in kettle and melt; mix the flour with butter, add 6½ gallons water and stir constantly until it boils; then turn off steam and mix in all the other ingredients, including the rice. Place while hot in 3-pound cans, cap, tip and process 70 minutes at 250 degrees.

IRISH STEW.

Make and process same Beef Stew, substituting 200 pounds mutton for the 100 pounds beef.

ROAST VEAL.

Handle and process same as beef.

VEAL LOAF.

70 pounds Boiled Veal, boned.
10 pounds Boiled Ham.
20 pounds Bread Crumbs.
½ pound Salt.
½ pint Onion Juice.
6 dozen Eggs.
¼ pound ordinary Black Pepper.
2 ounces ordinary Sage.
3 ounces ordinary Cloves.
2 ounces ordinary Allspice.

Chop the veal and ham very fine; beat the eggs, and add the onion juice; then mix all the ingredients together. Press in moulds of same shape and size as cans, turn out, and brush with new milk, lay in baking pan and place in oven to brown; when colored, place in cans, solder lid, tip, and process 1-pound cans 55 minutes at 250 degrees.

JELLIED VEAL.

100 pounds Knuckle of Veal.
2½ pounds Onions.
2 ounces Mace, whole.
2 ounces Cloves, whole.
1 ounce Bay Leaves.
4 ounces Whole Black Pepper.
2 pounds Salt.
1 quart Vinegar.
1 pint Worcestershire Sauce.

Cut the veal in small pieces, place in kettle, and cover with cold water, bring to a boil and simmer one hour; then add the onion and allspice enclosed in a bag, and simmer one hour longer; take out the meat, remove the bones and pack in cans; add the vinegar and sauce to the liquor, strain and pour over meat in cans, cap, tip, and process in 1-pound cans 40 minutes at 250 degrees, and 2-pound cans 55 minutes at 250 degrees.

ROAST VENISON.

Handle and process same as beef, adding 1 ounce butter for each pound in roasting pan; make gravy same way, but replace one quart of the water with sherry wine.

TONGUE, BEEF'S.

Soak salted or smoked tongue in cold water 12 hours; place in kettle and cover well with cold water; bring to a boil and simmer two or three hours, according to size; take from kettle and remove skin, commencing at tip and stripping back to root. Roll it and place in can, fill can with veal stock. Solder on lid, cap, tip and process small tongues 60 minutes at 250 degrees; medium tongues 90 minutes at 250 degrees; large tongues, 120 minutes at 250 degrees.

TONGUE, PIG'S.

Soak salted tongues in cold water for 12 hours; place in kettle, cover with cold water, bring to a boil and simmer two hours; take from kettle and remove skin; pack in flat cans and fill with veal stock; solder on lids and tip; process 1-pound cans 60 minutes at 250 degrees; 2-pound cans 90 minutes at 250 degrees.

TONGUE, SHEEP'S.

Handle and process same as pig's tongues.

POTTED BEEF.

85 pounds Beef.
20 pounds Salt Pork.
3 pounds Salt.
1½ pounds Mixed Spice.

Plunge the beef in salted, boiling water and cook until very tender; cover the pork with cold water, bring to a boil, and cook 2½ hours; remove all bones from the beef and skin the pork; grind the mixed beef and pork to a smooth paste, thoroughly incorporate the salt and mixed spices, place in cans, cap, tip and process ¼-pound cans 40 minutes at 250 degrees; ½-pound cans 45 minutes at 250 degrees; 1-pound cans 50 minutes at 250 degrees.

Mixed spices for above: 2 pounds ground white pepper, ¼ pound cayenne pepper, 1 ounce powdered nutmegs, 4 ounces powdered cinnamon seed, 2 ounces summer savory, 1 ounce powdered sweet marjoram and 2 ounces powdered thyme.

POTTED HAM.

Place 10 pounds of ham or shoulders in kettle and cover well with cold water; add ¼ pound mace, ½ pound cloves and 1 ounce bay leaves; bring very slowly to a boil and simmer 4 hours; when done, take out and remove the skin and bone, and grind to a paste; add ¾ pound ground white pepper, 4 ounces ground cayenne pepper, 2 ounces powdered sage and salt, if necessary; place in cans, cap, tip and process same as beef. If the hams are very fat, use a portion of them for beef and tongue in place of pork.

POTTED TONGUE.

75 pounds Salted Tongue.
25 pounds Salted Pork.
3 pounds Salt.
½ pound Ground Black Pepper.
1½ ounces Powdered Cloves.
1½ ounces Powdered Allspice.
1 ounce Coriander Seed.
½ ounce Bay Leaves.
1 pint Onion Juice.

Soak tongues 12 hours in cold water; place in kettle, cover with cold water, bring to a boil and simmer 3 to 4 hours, according to size; when done take out and remove skin; cook the pork and skin; grind very fine and mix with the other ingredients; place in cans, cap, tip and process same as beef.

POTTED CHICKEN.

90 pounds Chicken.
10 pounds Salt Pork.
5 pounds Onions, sliced.
4 pounds Salt.
1 pound Parsley.
½ pound Ground White Pepper.
¼ pound Whole Cloves.
2 ounces Mace.
1 ounce Bay Leaves.

Cook and skin the pork, same as for beef; draw and clean the chickens; place in kettle with 2 pounds of the salt, the onions, parsley, cloves, mace and bay leaves; cover with cold water, bring to a boil; simmer until tender; take from kettle and remove skin and bone; grind to a fine paste; mix the remainder of the salt and the pepper with it; place in cans, cap, tip and process same as beef.

Use the liquor in which the chickens are cooked for chicken soup, or concentrate it to one-half its bulk, place in one-gallon cans, cap, tip and process 55 minutes at 250 degrees, and sell as concentrated chicken soup.

POTTED TURKEY, OTHER POULTRY AND GAME.

Make and process same as chicken.

ROASTED CHICKEN.

Draw, singe, clean and truss the chickens. Clean the giblets, place in kettle, cover with cold water, bring to a boil and simmer while chickens are roasting.

For each chicken put two thin slices of bacon and place chicken thereon; if to be canned, in halves, split lengthwise, or in quarters (breasts), cut before roasting.

Cover the bottom of pans with water in which salt has been dissolved (1 lb. for 100 pounds of chicken), and put pans in oven and cook one to one and a half hours; when done, take chickens and bacon out of pan, and make sauce.

To each pint of grease add 1 lb. butter and 1 pint of flour, mix smoothly, and add 2 gallons of water in which giblets were cooked, put on fire and stir constantly until it boils; chop the giblets fine and mix them in the gravy with ¾ of a lb. of salt, 1½ oz. ground white pepper and enough caramel to make a brown color.

Place chicken in can and fill can one-third full of the sauce, solder on lid, tip and process at 250 degrees, ¼ chicken size, 55 minutes; ½ chicken size, 65 minutes; whole chicken size, 80 minutes.

STEWED CHICKEN.

Draw and clean the chickens, cut each one in eleven pieces: place in kettle and nearly cover with boiling water, bring to a boil and simmer until tender; remove from kettle, skin and carefully bone, fill in cans and cover with the following sauce:

To each two gallons of the liquor, in which chickens were boiled, add one pint of flour, mixed with a little cold water, stir in and bring to a boil; add 1½ ounces of ground white pepper and ¾ pounds of salt. Cap, tip and process at 250 degrees, 1 lb. cans, 55 minutes; 2 lb. cans, 65 minutes.

Richer sauce may be made by using a portion of cream and yolk of eggs. If it is desired, the chicken may be packed without removing bones, in which case allow a process of 10 minutes more.

CHICKEN IN JELLY.

100 pounds Chicken.
3 pounds Onions, chopped.
1 ounce Bay Leaves.
1 ounce Whole Mace.
2 ounces Whole Cloves.
3 pounds Salt.
¾ pound Gelatine.

Draw and clean the chickens, cut each in eleven pieces, place in kettle and cover with meat jelly, adding the salt and onions and spices in a bag; bring to a boil and simmer until tender; remove the

chicken and carefully skin and bone; add the gelatine, which has been soaked in cold water for an hour, to the liquor in the kettle and stir until dissolved, then strain; if the liquid is not clear, clarify with white of egg.

Place the chicken in cans, cover with the liquid, cap, tip and process at 250 degrees, 1 lb. cans, 55 minutes; 2 lb. cans 65 minutes.

ROASTED TURKEY.

Same as chicken except that the turkey is roasted whole, then cut in can size pieces.

BONED TURKEY AND TURKEY JELLY.

Same as chicken.

ROASTED DUCK.

Same as turkey, adding to the spices one-half as much finely powdered sage as there is of pepper.

ROASTED GOOSE.

Same as turkey, omitting the bacon, and using an equal weight of pepper and finely powdered sage.

Goose may be packed with sauerkraut; place the desired quantity of goose in the can, then completely fill with kraut, cooked same as for canning.

ROASTED GUINEA FOWLS.

Same as chicken.

ROASTED SMALL GAME BIRDS,

Such as Partridges, Pheasants, Quail, Grouse, Prairie Fowls, Woodcock, Snipe, Plover, Rail and Reed Birds, should be drawn and cleaned, dusted lightly with white pepper, placed in pan with a reasonable amount of butter and roasted until done. Then place in cans, dividing the gravy among them, solder up, tip and process at 250 degrees, ½ lb. cans 55 minutes, 1 lb. cans 65 minutes, 2 lb. cans 75 minutes.

MILK

Canned, condensed or evaporated milk is one of the large industries in this country. It is put up as plain or sweetened evaporated milk. The condensory is usually located in a good dairy section where a sufficient quantity of milk can be obtained by direct delivery in a very short time. The production must be under similar conditions to those obtaining in city dairying. The cows must be healthy, the dairy sanitary, the milking done in a cleanly manner, and the milk cooled and delivered promptly. The matter of cooling and prompt delivery is more important than in the city delivery, for the production of a slight acidity will interfere with condensing to a consistency where the product will comply with the law. On being received at the condensory the milk is immediately tested for acidity and fat, and if the former exceeds 0.2 of 1 per cent., the milk is rejected for regular trade, though it may be accepted at a lower price for making a cheaper grade for confectioners' use.

The milk is run through a clarifier to remove any foreign material not taken out by the home strainer. It is next drawn into a large tank which will hold an amount sufficient to charge the pan. The milk of several herds is mixed in order to secure uniformity in the fat content. Each tank is tested for fat and solids, so that the exact ratio of concentration needed to give a certain result may be known. The milk is given a preliminary heating, usually to 190 degrees F., though there may be some variation in the different plants. The milk is then ready for the vacuum pan, which consists of a large copper kettle completely hooded and connected at the top with a pump. The milk is heated in this kettle by means of a coil on the inside. The pump draws a vacuum of 25 to 29 inches, and evaporation with violent agitation takes place at 130 degrees F.; the temperature is usually kept below 150 degrees. When the batch is nearly finished, a "strike" is made or a sample is drawn to test the consistency. The milk may or may not be run through a homogenizer to divide the fat into such fine particles that the cream will not rise in the finished product. It is next drawn into a filter, and in so doing the temperature may be raised to about 165 degrees or 170 degrees F., or the can may be filled cold.

The processing is done in retorts which differ from those used in vegetable packing, in that special crates are provided which carry the cans and revolve so that the contents will be kept in a smoother condition. Both the time and temperature for condensation vary in different factories, and in careful work tests are made on a few cans before the batch is processed. In general, it may be said that the temperature varies from 225 degrees to 240 degrees F., the time depending upon the degree of condensation desired, the condition of the milk and the size of the can. Twenty minutes for a 6-ounce and 28 minutes for a 12-ounce can at 240 degrees F. is safe. Immediately at the close of the cooking the cans are cooled, placed in cases, and shaken for three minutes.

SOUPS

The canning of soups entails a great amount of labor, and particular care, but if properly handled should realize to the packer a good average profit on his investment.

There is very little in the way of mechanical equipment in the factory. The only requirement outside of the boiler is a number of open kettles or tanks, in proportion to the amount of work to be done. The tomato peeling tables will serve in pretty much the same capacity for preparing the vegetables and meats, and, with the usual trucks, cages and process kettles, the factory is mechanically complete.

The cage or crate referred to below should be made to suspend in the wooden tank while cooking; that is, it is made so that it will contain the meat or bones, or what the directions may call for, so as to keep them separate from the liquids, although cooked with them.

Good soups cannot be made without good materials, and an abundance of them. Pure, soft water must be used; if nothing but hard water is obtainable, soften it by dissolving ½ oz. Carbonate Ammonia in each 12½ gals. Always use cold water to cover the meat; if time allows, let it soak for some hours before turning on steam; bring to the boiling point very slowly; never let it come to a full boil for at least an hour after turning on steam; if making stock for clear soup, watch it closely, as it comes to a boil, and skim off the coagulated albumen which rises at this time. If not promptly removed, it settles to the bottom and makes it more difficult to clarify.

Never boil soup hard; after the first boil, cut, steam and cook at a gentle simmer. *Never add salt to stock until the meat is taken out.*

Make stock in a square wooden tank with closed copper coils and a draw off in bottom. Have a cage or crate or tinned iron or perforated copper, made to fit it neatly, in which to place the meat and other materials. The cage should be provided with a partition to keep materials separated when necessary, or a smaller cage may be used. The draw-off valve of the stock tank should be 3 or 4 feet above the floor, so that contents can be discharged directly into the cooling tanks.

Cooling tanks should be mounted on wheels, so that they can be readily moved from the kitchen to a cooler place. Provide a screen of wire or perforated copper to place over discharge pipe of kettles. Have tight-fitting covers for tanks and kettles.

CONDENSED SOUPS,

Or concentrated soups, while they do not furnish the consumer quite so fine an article as the regular liquid soups, are nevertheless tasty and nutritous, and owing to the very moderate cost of the diluted soup, enjoy a large sale. Packed in No. 1 cans, the directions are to dilute with 1 pint hot water, heat thoroughly and serve.

PROCESS TIMES.

Unless otherwise noted the process time for soups in quarts is 50 minutes at 250 degrees; for condensed soups in No. 1 cans, 30 minutes at 250 degrees.

ALBUMEN CLARIFYING SOLUTION.

One gal. white of eggs and shells from same, 1 gal. water. Wash the eggs, separate the white from the yolks, add the water to whites and beat, strain through muslin; crush the shells and mix with water and whites.

ISINGLASS CLARIFYING SOLUTION.

Take 4 oz. genuine Russian Isinglass, cover with cold water and soak 6 hours; then drain off water and add 1 gal. water in which has been dissolved 3 oz. Tartaric Acid, stir and beat the mixture, adding cold water gradually until 3 gals. of a smooth, heavy syrup is produced. No heat whatever must be used in the preparation of this article.

PLAIN SOUP STOCK.

1000 lbs. Beef.
125 gals. Water.
25 lbs. Chopped Onions.
25 lbs. Chopped Carrots.
25 lbs. Chopped Turnips.
10 lbs. Celery, or Celery Seed 1 lb.
1 lb. Whole Cloves.
½ lb. Thyme.
½ lb. Bay Leaves.

Cut off all the meat, crack and cut bones so as to expose all the marrow; place bones in crate and pile meat on top, drop in cold water in tank and bring to a boil; remove scum when it rises, then simmer seven hours. Then add the vegetables, cloves and thyme and simmer one hour longer; a half hour before time elapses add the bay leaves; when time expires, shut off steam, hoist out cage and gauge stock, adding sufficient boiling water to make 125 gallons.

Strain through a wet bag into cooling tanks; when it "jells" remove grease from top and it is ready for use.

The cold grease from stock and bouillon may be purified by melting and washing in boiling water in which has been dissolved 1 per cent. bicarbonate soda. Carefully dip off the clear grease and when cold incorporate ½ oz. of salt per pound. This can be used in place of butter for browning meat.

BOUILLON.

1000 lbs. Lean Beef.
125 gals. Water.
25 lbs. Chopped Onions.
15 lbs. Celery, or 1½ lbs. Celery Seed.
3 lbs. Salt.
1 lb. Green Parsley.
1 lb. Ground White Pepper.
¼ lb. Bay Leaves.

Free the meat from all fat, chop fine, place in tank with the water, celery, onions and bay leaves; bring to a boil and skim promptly at the first rise. Simmer gently six hours; add the pepper and parsley 15 minutes before the cook is finished; pull out cage, add salt, gauge tank, add boiling water to make up loss. Run through a wet strainer into cooling tanks.

Remove grease and place jelly in kettle, melt and add 62½ pints Albumen Solution or 30 pints Isinglass Solution, mix thoroughly and boil 10 minutes; turn off steam, add 5 gals. ice cold water and strain through canton flannel; add 2½ pints Caramel, place in quart cans, cap, tip and process.

CONDENSED BOUILLON.

Make same as Bouillon, using three times the amount of Onions, Bay Leaves, Celery, Parsley, Salt and Pepper; dissolve in it 2½ lbs. Extract of Beef.

CONSOMME.

500 pounds Lean Beef.
500 pounds Knuckle of Veal.
125 gallons Water.
20 pounds Chopped Leeks.
15 pounds Chopped Celery.
15 pounds Chopped Carrots.
32 pounds Butter, or Purified Fat.
1 pound Grain Pepper.
¼ pound Bay Leaves.
¼ pound Thyme.

Cut all the meat into pieces; place the butter in an iron pot over fire and brown; add the meat and stir until brown, then place meat in cage, handle, clarify and process same as Bouillon.

If a cheaper grade is desired, omit the butter and browning of meat; add 2 pounds salt, and color with one pint Caramel.

CONDENSED CONSOMME.

Make same as Consomme, using three times the vegetables and spices, and dissolving in it 2½ pounds Extract of Beef.

BARLEY SOUP.

50 gallons Plain Stock.
12½ pounds Barley.
1 pound Salt.
½ pound Parsley.
¼ pound Ground White Pepper.

Wash the Barley in cold water; then drop into 30 gallons boiling water, and cook slowly about 1½ hours; then throw Barley into cold water. Place the stock in kettle, add the pepper and salt, and the parsley enclosed in a bag or perforated spice-box; bring to a boil and add the Barley, drained free from water; let come to a boil again, then turn off steam and remove the parsley; fill into cans.

When filling cans stir the kettle and dip from the bottom into a 3 or 4 gallon pail; have a dipper or measure with long handle, holding just enough to fill can properly; dip this measure to the bottom of pail each time; this insures the equal distribution of the Barley; cap, tip and process.

BEAN SOUP.

25 pounds Pea Beans.
12½ pounds Ham, boned and skinned.
37½ gallons Boiling Water.
50 gallons Stock.
2½ pounds Salt.
¾ pound White Pepper.

Cover beans with cold water and soak 12 hours. Dice the ham and place in small cage. Add the drained beans and ham to the 37½ gallons of boiling water and cook two hours, or until beans are very soft. Take beans and ham out of kettle, run beans through a rotary pulper, and return to water in kettle, adding the pepper, salt, stock and ham from cage. Place in cans, cap, tip and process.

CONDENSED BEAN SOUP.

Make same as bean soup, but use no water, cooking the beans directly in the stock, and dissolve in it 1 pound Extract of Beef. It may be cheapened, by substituting purified grease from stock for the ham.

CHICKEN SOUP.

150 gallons Water.
800 pounds Chicken.
50 pounds Onions, chopped finely.
4 pounds Parsley.
¼ pound White Pepper.
75 pounds Rice.

Clean the chicken, place in tank with the cold water, bring slowly to a boil and simmer three hours; skim off all the grease, add the onions and parsley, boil 10 minutes, then draw off and strain. Place in kettle, bring to a boil and add the rice. Cook 25 minutes, add the salt and pepper, shut off steam, place in cans, cap, tip and process.

If desired the white meat may be separated and added with the salt and pepper, or the entire chicken may be used for chicken gumbo or potted chicken.

CONDENSED CHICKEN SOUP.

Make same as chicken soup, using 1 pound more salt and double the quantity of rice. Chop and add all the chicken meat, both white and dark.

CHICKEN GUMBO SOUP.

50 gallons Chicken Soup.
50 pounds Chicken Meat.
50 pounds Lean Ham.
50 pounds Canned Okra.
30 pounds Canned Tomatoes.
6½ gallons Water.
1 ounce Cayenne Pepper.

Cut the ham in dice, place in kettle, cover with water and cook 45 minutes add all the other ingredients, bring to a boil. Place in cans, cap, tip and process.

CONDENSED CHICKEN GUMBO.

Make same as chicken gumbo soup (using chicken soup with double the quantity of rice), but do not use the water in which ham is boiled.

CLAM SOUP.

1500 Quahaugs.
58 gallons Stock.
4 pounds Corn Starch or Flour.
5 pounds Butter.
½ pound Ground White Pepper.
½ pound Parsley, chopped fine.
2 pounds Salt.

Open the clams and wash well in cold water, chop fine and place in kettle with the stock, turn on steam and melt the stock. Melt the butter and mix with the flour. Add this to contents of kettle and stir continuously until it boils, then turn off steam. Add the pepper, salt and chopped parsley. Place in cans, cap, tip and process.

CREAM OF ASPARAGUS SOUP.

25 gallons Asparagus Pulp.
25 gallons New Milk.
25 gallons Stock.
4 pounds Corn Starch or Flour.
5 pounds Butter.
2 pounds Salt.
½ pound Ground White Pepper.

Place the milk in kettle and bring to a boil. Melt the butter and mix intimately with the corn starch or flour. Add to the milk and stir continuously until it thickens. Add the stock, asparagus pulp, salt and pepper, bring to a boil, place in cans, cap, tip and process.

Milk may be omitted and stock substituted, in which case use double the amount of thickening.

CONDENSED CREAM OF ASPARAGUS SOUP.

Make same as cream of asparagus soup, using double the amount of salt and spice, one-half more butter and flour and adding 1 pound Extract Beef.

CREAM OF CELERY SOUP.

Make same as cream of asparagus soup, using pulped celery and adding one-half pint onion juice.

CONDENSED CREAM OF CELERY SOUP.

Make same as condensed cream of asparagus soup; using pulped celery and adding one-half pint of onion juice.

CREAM OF PEA SOUP.

Make same as cream of asparagus soup, using 12½ gallons pulp from green or canned peas.

CONDENSED CREAM OF PEA SOUP.

Make same as condensed cream of asparagus soup, using 12½ gallons of pulp from green or canned peas.

GREEN TURTLE SOUP.

Prepare same as for canning. When cooking the meat, head, etc., in liquor in which the shells were boiled, for each 10 pounds meat add 1 pound chopped onions, ¼ ounce bay leaves, ½ pound pot herbs and 1 pound dried ham cut in small pieces. Cook until meat is done, then remove cage containing meat and strain liquor. In the meantime melt ¾ pound butter and mix with ½ pound flour, add 1 quart liquor and bring to a boil, then add 2 ounces sugar and 1 quart wine. Mix the meat liquor and thickened liquor all together with the chopped yolks of 2 dozen hard boiled eggs, juice of 1 dozen lemons and ½ ounce of cayenne pepper, place in cans, cap, tip and process.

JULIENNE SOUP.

100 gallons Stock.
25 pounds Carrots.
12½ pounds Turnips.
15 pounds Celery.
5 pounds Onions.
5 pounds Leeks.
5 pounds Cauliflower.
5 pounds Peas, canned.
5 pounds Asparagus Tips, canned.
3 pounds Salt.
¼ pound Ground White Pepper.

Pare and cut the carrots and turnips in straws, cut the celery in half-inch pieces, chop the onions, cut leeks in quarter-inch pieces and break cauliflower into small pieces. Put the stock in kettle and bring to a boil, add the carrots and turnips and cook 10 minutes, add the celery, onions, leeks and cauliflower and boil 10 minutes more. Add the asparagus, peas and salt and pepper. Turn off steam and draw off the stock, divide the mixed vegetables among the cans and fill with the stock, cap, tip and process.

CONDENSED JULIENNE SOUP.

Make same as julienne soup, using but 50 gallons stock, in which dissolve 1 pound Extract of Beef.

MACARONI SOUP.

50 gallons Stock.
12½ pounds Macaroni.
1½ pounds Salt.
¼ pound White Pepper.
½ pound Parsley.

Break the macaroni in small pieces, throw in salted boiling water and cook 30 minutes; then throw in cold water; now handle and process same as barley soup.

CONDENSED MACARONI SOUP.

Make same as macaroni soup, using 25 gallons stock and adding 1 pound Extract of Beef.

MOCK TURTLE SOUP.

60 gallons Water.
1 gallon Sherry Wine.
50 Calves' Heads.
50 Calves' Hearts.
4 dozen Lemons.
1½ pints Worcestershire Sauce.
25 pounds Calves' Liver.

5 pounds Chopped Carrots.
5 pounds Chopped Onions.
5 pounds Chopped Turnips.
½ pound Whole Cloves.
¼ pound Sweet Marjoram.
½ pound White Pepper.
2 pounds Mixed Green Pot Herbs.
10 pounds Butter.
8 pounds Flour.
3 pounds Salt.

Unjoint the jaws and take out the brain, clean thoroughly with boiling water; split the hearts and trim liver; place in tank with the cold water, turn on steam and skim at first boil, then skim about 15 minutes later; simmer two hours or until meat is tender. Take from tank the hearts, liver and heads, remove meat and tongues from head.

Return the bones to kettle with the vegetables, herbs and cloves. Cook slowly two hours, draw off and strain into cooling tank. Cut the liver into dice, slice and chop the hearts, tear meat into small pieces, chop the tongues, place the butter in an iron pot and brown, then add the flour and brown. Skim the grease from the stock and place in kettle, add the browned flour, mix and bring to a boil, stirring all the time. Add the meat, tongues, heart and liver, boil two minutes and shut off steam. Add the juice of the lemons, sauce, pepper, salt and sherry wine, place in cans, cap, tip and process.

CONDENSED MOCK TURTLE SOUP.

Make same as Mock Turtle Soup, using 45 gallons of water instead of 60, and adding double the quantity of Worcestershire Sauce, pepper and lemons and 1 pound Extract of Beef.

MULLIGATAWNEY SOUP.

100 pounds Chicken.
4 pounds Sliced Onions.
2 pounds Butter.
1 pound Salt.
1 pound Curry Powder.
2 ounces Whole Cloves.
1 dozen Lemons (juice of).
20 gallons Water.

Clean the chicken and cut to can hole size. Put the butter in an iron pot with the onions and chicken and brown.

Add the curry, salt, cloves, and lemon juice. Place this mixture in kettle with the cold water, bring slowly to a boil, simmer two hours, then take out the chicken, divide among the cans, fill with the hot liquor, cap, tip and process.

Mulligatawney may be made from the regular chicken soup by adding 40 pounds cooked chicken meat, juice of 2 dozen lemons, 8 pounds of onions browned in grease and 2 pounds curry powder to 100 pounds soup.

CONDENSED MULLIGATAWNEY SOUP.

To 40 gallons condensed chicken soup, add 40 pounds chopped chicken meat or veal, juice of 4 dozen lemons, 12 pounds onions browned in grease, and 2 pounds curry powder.

OX TAIL SOUP.

125 gallons of Water.
½ gallon Sherry Wine.
1 quart Caramel.
1000 pounds Ox Tails.
10 pounds Butter or sufficient.
25 pounds Chopped Onions.
25 pounds Chopped Carrots.
25 pounds Chopped Turnips.
½ pound Whole Cloves.
¼ pound Bay Leaves.
4 pounds Salt.
½ pound Ground Black Pepper.

Joint or chop in 1-inch pieces the ox tails, place those larger than can hole size in a small cage; melt the butter in an iron pot and brown the small pieces; skim out and place in another small cage. In another separate cage place the vegetables with the bay leaves and cloves. Place all in tank with the cool water, turn on steam, bring to boil and simmer 1½ hours, then remove cage containing small pieces of tail. Cook remainder a half hour, or until the large pieces are very tender; then take them out, separate meat and return to kettle. Shut off steam, remove the vegetables, add the salt, pepper, sherry and caramel, divide the small joints among the cans, fill with the hot liquor, cap, tip and process.

CONDENSED OX TAIL SOUP.

Make same as ox tail soup, using 100 gallons water and double the quantity of everything except ox tails and butter, and add two pounds of extract of beef. Thicken with 10 pounds of corn starch, mixed with cold water, before the salt, pepper, sherry and caramel are added.

PEA SOUP.

Make same as bean soup, using 25 pounds split peas in place of beans.

CONDENSED PEA SOUP.

Make same as condensed bean soup, replacing beans with split peas.

RICE SOUP.

Make same as Macaroni, using 12½ pounds rice instead of macaroni.

CONDENSED RICE SOUP.

Make same as condensed Macaroni, using 12½ pounds rice instead of macaroni.

TOMATO SOUP.

84 gallons Pulp from machine, or its equivalent in canned pulp.
28 gallons Water.
12 pounds Salt.
12 pounds Butter and 11 pounds Sugar.
6 pounds Flour.
10 pounds Chopped Onions.
½ pound Chopped Garlic.
6 ounces Ground White Pepper.
6 ounces Bay Leaves.
1 ounce Powdered Saigon Cinnamon.

Place the butter and pulp in kettle and bring to a boil; then add the onions and garlic and simmer one hour, adding water to make up for loss by evaporation. When the cook is half finished, add the bay leaves and when within ten minutes of the finish add the salt, sugar and pepper; and two minutes before the time is up, add the cinnamon and the flour mixed with water; boil two minutes, turn off steam, run through rotary pulper or shaker, place in cans, cap, tip and process No. 3 cans 45 minutes at 240 degrees.

CONDENSED TOMATO SOUP.

120 gallons Pulp from machine or its equivalent in canned pulp.
1 gallon Water (cold).
14 pounds Salt
12 pounds Sugar.
15 pounds Onions, chopped fine.
2 pounds Butter.
1 pound Beef Extract..
5 pounds Corn Starch.
6½ ounces Ground White Pepper.
1 ounce Ground Saigon Cinnamon.
½ ounce Mace.

Place the pulp and butter in a kettle and bring to a boil, then add the onions and cook 40 minutes. When the cook is within 10 minutes of the finish, add the extract of beef, salt and sugar and pepper; when within 2 minutes add the cinnamon and mace; mix

the cold water and corn starch, stir in, and when it boils, turn off steam, then run through rotary pulper or shaker, place in cans, cap, tip and Process No. 1 cans 30 minutes at 240 degrees.

VERMICELLI SOUP.

Same as macaroni soup, using 12½ pounds vermicelli and breaking bundles in three lengths.

CONDENSED VERMICELLI SOUP.

Make same as condensed macaroni soup, using 12½ pounds vermicelli and breaking in three lengths.

VEGETABLE SOUP.

100 gallons Stock.
50 gallons Water.
15 pounds Carrots, diced.
20 pounds Turnips, diced.
20 pounds Sweet Potatoes, diced.
25 pounds White Potatoes, diced.
20 pounds Sugar Corn, canned.
10 pounds Peas, canned.
10 pounds Lima Beans, canned.
20 pounds Tomatoes, canned.
12 pounds Rice.
5 pounds Salt.
1 pound Ground White Pepper

Wash, pare and dice the vegetables. Put the water in the kettle with the carrots and turnips, bring to a boil and cook one-half hour, then add all the other vegetables except the canned stock and the rice; bring to a boil and cook 20 minutes, then add the stock, salt, pepper and canned vegetables; bring to a boil, shut off steam, place in cans, cap tip and process.

CONDENSED VEGETABLE SOUP.

Make same as vegetable soup, omitting the water and cooking in stock, adding 2½ pounds beef extract. This may be cheapened by using more rice and less vegetables.

CLAM CHOWDER.

5000 Quahaugs, or Hard Shell Clams.
15 pounds Onions.
50 pounds Bacon.
50 pounds Tomatoes.
50 pounds Potatoes.
2 pounds Salt.
1 pound Ground White Pepper.
½ pound Parsley, chopped fine.
¼ pound Thyme.
⅛ pound Sweet Marjoram.
30 gallons Water.

Wash the clams, either steamed or raw shucked, in cold water, drain and chop. Cut the bacon and potatoes in dice. Place the water, clams, onions, bacon, tomatoes and potatoes in kettle, bring to a boil and cook 10 minutes; then add other ingredients; stir thoroughly and place in cans, cap, tip and process No. 3 cans 80 minutes at 250 degrees.

CONDENSED CLAM CHOWDER.

Make same as clam chowder, using half the quantity of water, but after all ingredients are added and mixed and steam turned off, draw the liquid from bottom of kettle, fill the cans with the solid materials and cover with the liquid; then cap, tip and process No. 1 cans 40 minutes at 250 degrees.

SPECIAL CHOW-CHOW DRESSINGS

SPICED VINEGAR.

1 pound Whole Cloves.
1 pound Whole Allspice.
½ pound Crushed Cinnamon.
½ pound Crushed Ginger Root.
5 gallons 45-grain Vinegar.

Soak the spices in the vinegar 12 hours; place in a suitable kettle and bring to a boil; then simmer gently one hour; strain off the liquid and add enough vinegar to make 5 gallons.

CHEAP DRESSING.

5 gallons Prepared Mustard, German style.
2 pints Sweet, or Salad Oil.
1 gallon Spiced Vinegar, or enough to sufficiently thin the mustard.

Beat the oil into the mustard first, then add the vinegar gradually. To make a better grade use olive oil and add one to two lbs. of sugar.

HIGH-GRADE DRESSING.

10 pounds Flour.
7½ pounds Ground Yellow Mustard.
7½ pounds Ground Tumeric.
5 pounds Salt.
7½ pounds Sugar.
5 gallons Spiced Vinegar.
5 pints Olive Oil.

Mix all the dry ingredients with the cold, spiced vinegar; place on fire and stir continuously until it comes to a boil and thickens; remove from fire and stir in the oil, beating it until the oil globules disappear; cool and use.

Onions and garlic may be added in making the spiced vinegar if desired; also cayenne or chille pepper, if wanted very hot.

PRESERVES

The U. S. Standards are:

Preserve is the sound product made from clean, sound, properly matured and prepared fresh fruit and sugar (sucrose) syrup, with or without spices or vinegar, and conforms in name to that of the fruit used, and in its preparation not less than forty-five (45) pounds of fruit are used to each fifty-five (55) pounds of sugar.

Honey preserve is preserve in which honey is used in place of sugar (sucrose) syrup.

Glucose preserve is preserve in which a glucose product is used in place of sugar (sucrose) syrup.

The Manufacture of Food Products more nearly expresses the meaning than "preserving," which, in its broad sense, covers not only the combination of fruits in heavy syrup, but also indicates the combination of sugar and various food substances in other forms, besides many incidental lines in which sugar is but a small factor, though classed under this general head. This is the most promising new field to the canner and to which he naturally first turns for a winter pack. The line and grade of products apt to be most profitable depends on the character, variety, volume and cost of the raw materials obtainable locally modified by the distance from, and consequent transportation charges on, supplies that must be purchased outside.

Under usual conditions factories are fitted up for making jellies, preserves and butters as the primary object, and where possible are arranged according to the gravity system as explained under Apple Juice. The capacity and requirement of factories, the number and size of tanks, kettles, etc., the character and elevation of buildings vary so much that a specific plan is required for each and it is not practical to give more than a mere outline of the arrangement of plants here.

THE BUILDINGS.

When a new building is erected especially for the purpose it is easy to provide skylights over the cookers and kettles, but in an old building it is sometimes difficult. When the cooking, filling and finishing departments are in the same room, means must be provided to carry off the steam; wings extending down in front of the kettles with an exhaust fan are quite effectual, but the better plan is to build, outside the building on brackets, a gallery with dog house skylights, or to build a solid partition between the cook room and finishing department. Goods finished for sale must not be stored in these rooms.

Water-tight floors are a necessity in the juice and cook rooms, and are an advantage in the finishing room. Cement and asphaltum may be used, but wood is preferable. A satisfactory floor is made with ship plank, well caulked and pitched; or over a common floor place 2 layers of 3-ply roofing felt, cover with a heavy coat of hot pitch, and in this, while hot, lay a tight maple floor. Still better, but quite expensive, use sheet lead, soldered together, instead of roofing paper. When practical slope the floors to the sewer opening.

An ample supply of cold water is required either piped directly to each kettle and tank or tapped at convenient points so that a hose will readily reach them. Wash tanks of reasonable size must be established and provided with a steam jet for heating.

MECHANICAL EQUIPMENT.

On the upper floor, elevated above the load line of the press, put the waste cookers, and on the floor with press place the glucose tank (with closed steam-coil in bottom so that glucose may be warmed enough to make it flow readily), if the glucose is pumped from tank cars; or, the skids or trestle for draining barrels if it is purchased in this way; in which case place the glucose tank on same level with the juice storage tank. If glucose is purchased in barrels, also provide on this floor steam jets for steaming out the barrels.

From the glucose tank lead a 3-inch pipe with a like opening, controlled by a quick discharge valve, to each kettle. Let the valve end be one foot above and one foot away from the kettle; screw in a short nipple with an ell on end, and in this loosely screw a service ell.

In this ell screw a pipe 2 inches long. When drawing glucose pull the pipe down over kettle; when not in use set upright; this prevents the drip of glucose in kettle and keeps pipe out of the way.

From the juice storage tank, placed below the press and above the kettles, lead a 1½ or 2-inch pipe discharge into each kettle and also provided with a valve and swinging pipe; these pipes may be of iron, with brass pipe below the valve, if they are kept filled all the time either with juice or water; if used only at intervals use brass or copper pipes.

Place all the large jacketed kettles with bottom outlets on the outer edge of a platform 6 feet to 8 feet wide and 3 feet above the floor, so that the contents may be readily discharged into the cooling tables and "setting" tanks." Provide one of these with a mechanical stirrer for use in fruit butters and other pasty masses.

Where a series of small kettles without bottom outlets, of the same or different sizes, are installed, provide a table, or counter, of 2-inch stuff, 3 feet 6 inches from the floor, with openings so arranged that the kettles will fit therein with tops level with the surface of course supporting them with legs in the regular way. This counter will prevent slopping and protect kettles when filling. Each

kettle and closed coil should be provided with an individual steam trap; if several are connected with one trap, provide both a globe and check valve for the exhaust from each kettle. When traps are not provided and a series of kettles exhaust into one main, use a check valve on each exhaust.

It is economy to cover the jackets of copper kettles with asbestos or magnesia to prevent radition of heat. This can be accomplished on a plain kettle by riveting on a collar just above the jacket to support wire netting which will hold the insulating material in position; or, if preferred a sectional metal covering can be attached; for a flanged kettle, bolt the collar to the lower flange.

Provide a gauge stick, suitably marked, for each kettle, so that the contents may be accurately measured at any time. A permanent gauge should be placed in each tank. Closed coils for round tanks are best coiled from circumference to center, carrying the exhaust out through bottom of tank. For square tanks build a square coil of copper, or if iron use short pipes with ells, carrying exhaust out through bottom near the center. Tanks with coils arranged in this manner, conducting the live steam around the outside first, and discharging exhaust in middle, will cook much like jacketed kettles. "throwing" the liquid from sides to center.

COOKING.

When starting to cook with kettles or coils not connected with trap, open the exhaust valve wide, turn steam on slowly until all water is forced out of jacket, then turn on full steam pressure and nearly close the exhaust valve, allowing just sufficient opening to let the condensed steam escape. When attached to traps open steam valve slowly until full steam pressure is on.

The effect of prolonged, or secondary, cooking on fruits in heavy syrup is more marked in its changes of color and flavor than on vegetables and fruit in brine or light syrup to which attention has already been called.

COOLING.

In all instances when jams or preserves are to be placed in large packages, they must be cooled if the flavor and color are to be retained. The best and cheapest method is to spread out on a cooling table, which is nothing more than a shallow box mounted on wheels or castors, so that it can be readily moved from place to place. A box made of 1½-inch stuff 3 feet 6 inches by 7 feet 6 inches by 6 inches deep is a convenient size, and must be mounted low enough to run under draw-off pipes from kettles. It should be metal lined. If the table is intended also for meringue pie filler, make 10 inches deep, with a spout and shut-off slide at one end.

A cooling apparatus for syrup, and catsup, where the intermittent system of cooking is adopted, may be made of copper on the plan of an upright, tubular boiler, replacing the steam with

a constantly changing current of cold water from bottom to top, and replacing the fire with the substance to be cooled. The straight tubes can be readily scrubbed with a round brush on a long handle, and while this is not necessary with syrup it is with catsup, every particle of which must be removed after the day's run.

Mount all tables, on which glassware is filled, on castors.

A set of combination scales (with small platform and pan) placed on a box, fitted to contain a hatchet, extra weight, scoops, etc., and provided with castors, will prove a great convenience. Keep a small set of scales in a room or closet, adjoining the kettles where the spices and the various articles of this nature are stored under lock and key. For obvious reasons no one but the chief cook or his deputy should be allowed in this room.

When the method of diluting sugar preserves with jelly is adopted set a plain copper kettle (same as used for setting up with brickwork) flush with the surface of a suitable short-legged table mounted on castors; mix the preserves, jelly and coagulant in this and allow to partially set before filling into packages.

Racks mounted on wheels to hold the crocks or pans used in the modified Wiesbaden or maceration processes are preferable to stacking on floor, or using stationary racks.

THE PULP MACHINE.

Where space and conveniences allow, the large pulping machine used for preparing fruit butters, etc., is best placed on the same floor with the press; if the same cooker is used both for "apple waste" and these materials, place the machine so that the same trough will carry to press and feed pulper; run the finished pulp directly into kettle through a chute. For good work run the machine 200 to 250 revolutions per minute, feed regularly and slowly, so that it will not be necessary to choke the hole from which waste is discharged. Nothing is gained by over-crowding the machine. The life of the inner sieve may be lengthened by riveting to it a strip of copper 2 inches by 15 inches about 2 inches below the frame, covering a point at the feeding end where the paddles first throw the material and where the first break generally occurs. Use a small pulper provided with adjustable brushes and fitted with a metal plate containing the smallest obtainable perforations as a finishing machine for catsups; always fit this plate snugly to supporting sieve or plate containing large holes; the interior metal fittings, except the shaft, should be brass or bronze. Run the machine 250 to 300 revolutions per minute. Coat the bearings with graphite. *Clean these pulpers daily and in hot weather remove sieves.*

Vinegar of good quality is a desideratum; cider vinegar, made from sound fruit, is the best, but is hardly obtainable in most localities. Test manufactured vinegar for sulphuric acid and strength. A crude, but approximately correct method of testing strength is to

dissolve 100 grains bicarbonate potassa in enough water to make exactly 10 fluid drams; take one fluid ounce of the vinegar and add enough of the solution to neutralize it (judge this point with red and blue litmus paper, when both are just on the turn the liquid is neutral), the amount of the potassa in the solution used shows the grain; *i. e.*, if 6 drams solution is required, it is 60 grain vinegar, if 4½ drams, it is 45 grains.

Pure salt, in addition to its preservative and flavoring qualities, will, if added to sugar in proportion to ½ of 1 per cent. to 1 per cent., accentuate its sweetness and may be used to advantage in all sugar goods. Salt containing a large percentage of sulphates or magnesia is not suitable for this purpose.

As a disinfectant, when the rust stain is not objectionable, sulphate of iron (copperas) is probably the cheapest and best. Dissolve 1 pound to each gallon of water, and use freely. Creolin is a valuable disinfectant, but has a disagreeable odor.

When thought necessary, and *when admissable under the pure food laws*, benzoate of soda may be used in sweet goods in proportions not greater than one-tenth of 1 per cent.

To calculate the proper amount for a batch, reduce the total to ounces (multiply by 16) and point off three places; for instance, the batch contains 300 pounds—4,800 ounces—four and eight tenths ounces (4.8) to be employed.

(See Pure Food Laws at end of book.)

Where preservatives are not admissible, all grades of goods may be sterilized at 190 degrees; pure sugar and fruits may be processed at 212 degrees.

When cooking pure fruit and sugar goods the best results are obtained by starting the cook with a low steam pressure and gradually increasing the pressure as the syrup becomes heavier. When cooking fruit and juice together use a high steam pressure up to 80 or 90 pounds.

In preserving dried fruits, soak in cold water, and when plump handle the same as fresh fruit.

PURE FRUIT WITH SUGAR.

The general process applied to this class of preparations is exactly the opposite of the well-known diffusion process as used in the manufacture of sugar from cane and beets. Raw fruits placed in a saturated solution of sugar will shrink and become tough and unsightly, owing to the rapid absorption of the fruit juice by the sugar, which in a saturated or super-saturated solution has a greater affinity for the jucie than the fruit has for sugar, thus preventing the proper interchange. When fruit is placed in a weak solution of sugar diffusion takes place and in time the precentage of sugar in the syrup and in the fruit will be equal; if now the syrup is slightly strengthened by adding more sugar, the diffusion again equalizes the

sugar strength of the syrup and fruit; if this process is continued the fruit may be saturated or any desired amount introduced. Syrup at 26 degrees and below readily diffuses in fruit; above that degree it takes considerable time. Glucose acts in the same manner, and may be used alone or mixed in any proportion with sugar syrup. When permissible, a proportion of glucose, say 33 1-3 per cent., should be used as it prevents the crystallization of the sugar in the syrup and the goods are not so "dead" sweet as when pure sugar alone is used. During the entire process the fruits should remain plump, and if any signs of shrinking or wrinkling are observed, immediately reduce the strength of the syrup by adding a little water. When the syrup used reaches the density of 33 per cent. the further density must be increased, in part, by glucose, or the syrup must be boiled wtih ¼ ounce acetic acid, or ¼ ounce cream tartar, for each gallon.

The saturating may be done in covered stone jars of 2 to 3 gallons capacity, having an opening, to be stopped with a cork, in the side at the bottom to draw off the syrup, and provided with a perforated diaphragm fitting inside the jar; or in enameled flat pans with a suitable arrangement for keeping the fruit under the syrup. Surplus syrup may be used for future operations; clarified and used for packing fruits; used to flavor jellies or sold for soda fountain use. Unless otherwise mentioned, the gravity of the syrup is to be taken at the boiling point.

CANDIED FRUITS.

Fruits to be candied or crystallized must be under-ripe. Canned fruits. specially selected and treated may be used. Fruits may be candied by the quick process as given for orange peel; provide the tank with a series of sieves on which to place the fruits. By the French process fruits are bleached in sulphur fumes from 6 to 12 hours before being placed in syrup; artificial color is added to the syrup at 28 degrees when necessary.

APRICOTS.

Remove the seed with a pitting spoon; place in warm water and bring very gradually to near the boiling point; as they float to the top; place in jars; pour over them 25-degree syrup; drain off in 24 hours reboil and add enough sugar to make syrup 25 degrees again; pour over fruit; repeat the operation every day until 27 degrees is reached, then every two days until 31 degrees is reached; then every three days until 33 degrees is reached, then every 4 days until 36 degrees is reached; allow to remain 6 days, then wash in 30-degree syrup, place on trays and put in drying room.

BLACKBERRIES.

Same as strawberries.

CITRON, IMPORTED, FOR MINCE MEAT.

Soak in several changes of cold water to remove salt, then candy same as orange peel.

CITRON, DOMESTIC, FOR MINCE MEAT.

Peel off the green rind, cut in 1-8ths or 1-16ths, according to size, cut out all the seed pulp leaving only the firm outside flesh: soak this in two changes of strong brine for 12 hours each, then freshen in cold water; place in cold water; bring to a simmer and cook until tender, then candy the same as orange peel.

CHERRIES.

Place in jars and cover with boiling 20-degree syrup; in an hour draw off; add sugar to 24 degrees; repeat this every day until syrup remains at 24 degrees, then gradually increase 2 degrees at a time until 36 degrees is reached; then wash in 30-degree syrup. spread on trays and dry.

CRAB APPLES.

Same as pears.

NECTARINES.

Same as peaches.

PEACHES.

Drop the peaches in boiling water for a moment, then rub off skin; put in warm water, bring slowly to a boil and skim out as they rise; place in jars and cover with a 25-degree syrup, then treat same as apricots.

PEARS.

Select small, hard, underripe pears; thrust a copper needle several times through the pear from blossom end to stem; peel the pears and scrape them; place in kettle with cold water, bring to a simmer and cook until pears are softened; place in jars and cover with boiling 20-degree syrup; in 12 hours reboil and increase strength to 22 degrees, then gradually increase to 36 degrees, wash in 30-degree syrup and dry on trays.

PINEAPPLE.

Peel, remove all eyes and cut in slices a half inch thick; place in jars and cover with boiling 16-degree syrup; in 24 hours reboil syrup and add sugar to make 18 degrees; repeat every day, gradually increasing to 36 degrees; then wash in 30-degree syrup, place on trays and dry; when dry, cut a half-inch hole through core. If intended for Wiesbaden fruit, cut in pieces of suitable size and treat same way, bringing to 33 degrees.

PLUMS, DAMSONS AND GAGES.

Take canned, unripe fruit which had the skin well pricked before processing, cut and drain off juice; place in jars and cover with warm 25-degree syrup, drain and reboil to 25 degrees in 8 hours, then gradually increase every day. When saturated to 36 degrees, wash in 30-degree syrup and dry.

QUINCES.

Pare and core, cut in quarters or eighths, according to size, place in kettle, cover with cold water and bring nearly to a boil; drain off water and repeat; then place in jars and cover with cold 18-degree syrup, each 24 hours, draw off syrup, increase 2 degrees and pour back cold until 36 degrees is reached; wash in cold 25-degree syrup and dry. If the syrup jells during the process, wash out with warm water and replace with fresh cold syrup.

RASPBERRIES.

Same as Strawberries.

STRAWBERRIES.

Select firm, underripe berries, hull, place in jars and cover with cold 28-degree syrup, draw off and repeat with 28-degree syrup in 24 hours, then replace with 18 degree and each day increase 1 to 2 degrees; if berries appear to soften increase strength, if they shrivel decrease; continue to 36 degrees, wash in cold 25-degree syrup and dry.

ORANGE PEEL.

Place the orange peel in cold brine (5 lbs. salt, 12½ gals. water) in kettle and bring just to a boil; draw off and replace with cold water, bring to a boil, drain off and again add fresh cold water, bring to a boil and cook until tender; place the peel in a wooden tank provided with a copper coil and draw off in bottom, also with a grating at top to prevent floating. Cover with 12-degree syrup and turn on steam, keep the temperature just below 212 degrees; as the syrup evaporates replenish with 12-degree syrup; continue this until the syrup in tank marks 34 degrees, then drain off syrup; place the peel, concave side down, on sieves to drain; then place on trays, concave side up to dry; if it is desired to load the peel with sugar, pour syrup in each half before drying.

CANDIED FIGS.

Take small, underripe figs; prick the skin with needles and thrust through several times with a large needle; place in water, bring to a boil and cook until tender; cover with 12-degree syrup and candy same as orange peel to 35 degrees; then wash in 30-degree syrup and dry.

CANDIED GINGER.

Take imported green ginger in syrup and saturate to 34 degrees same as orange peel and dry without washing.

CANDIED TOMATOES OR TOMATO FIGS.

Select small, sound, ripe, yellow tomatoes; scald and peel; place in kettle with half their weight of sugar and warm gently until the sugar is absorbed, then place carefully on trays to dry, sprinkling with granulated sugar from time to time; when perfectly dry pack with granulated sugar between each layer.

CRYSTALLIZED FRUIT.

Use fruit prepared by the preceding processes in 36 degree syrup. For the large fruit, remove from the syrup and drain on sieves; then wash off all syrup with warm water. For the small fruits ,drain off the syrup and wash with warm 10-degree syrup. Place fruit on trays and dry: the surface must be entirely dry and not stick to fingers when handled. Have a box of suitable size containing a stack of tinned copper sieves 1½ to 2 inches apart, lay the fruit on these sieves, the larger pieces singly and the smaller in layers 2 or 3 deep. Make 33-degree syrup (it must be exactly 33 degrees at 212 degrees F.), cool and cover the fruit, allow to remain 6 to 12 hours, or until the fruit is covered with sugar crystals of sufficient size; then drain off syrup and dry fruit on sieves.

WIESBADEN FRUIT.

Take fruit saturated with 33-degree syrup by same process as candied fruits, pack in tall pint jars and fill with uncolored, hot 32-degree syrup, which has been boiled with acetic acid or cream tartar. Seal jars and sterilize one hour at 190 degrees. The French and German Wiesbaden fruits are bleached with sulphur at the first operation, then colored artificially if required.

WIESBADEN FRUITS, MODIFIED PROCESS.

Use a tilting jacketed kettle of 5 gals. capacity or less. For canned raspberries, strawberries and blackberries cut can and drain off juice: use sugar in proportion of 1 lb. to 1 lb. of drained berries. Make the sugar into 38-degree syrup, boiling with acid, place the fruit in and give a very gentle boil for one or two minutes, dump in pan and set aside 24 hours; then drain off syrup, add sugar to 30 degrees (cold) place in kettle, berries and syrup, bring to a boil and add enough sugar to make syrup 33 degrees (hot), then turn in pan for 24 hours. Then pack the fruit as nearly solid as possible in fruit jars, reserving the surplus syrup for next operation.

For all other canned fruits turn juice and fruit in kettle, add sugar enough to make 20 degree syrup, bring just to a boil, dump in pan and set aside 24 hours; then drain off syrup, add sugar to make 25 degrees, boil and pour back on fruit; next day add sugar to 30 degrees; next day to 35; next day drain off syrup and pack fruit solid in jar, then cover with hot 33-degree syrup boiled with acid. Seal tops and sterilize one hour at 190 degrees.

Process for fresh fruit (except berries), prepare fruit and place in kettle with cold water, bring to a boil, cook until tender, make syrup up to 20 degrees, and proceed same as with canned foods. For fresh berries give a little longer cook in the syrup than for canned fruit and handle the same.

COLD PROCESS.

Fruits for this process must be fully ripe and moderately soft. Proceed as directed under candied fruits, but do not cook the fruit. Make the syrup 2 degrees less than directed there, and make from cold water and sugar by agitation; saturate the fruit up to 33 degrees, adding the sugar and dissolving by agitation each time. The syrup may be made by heat, but must be cooled to 100 degrees or less before pouring on fruit. The operation must be carried out in a cool place. Fruits by this process are adapted for packing in cordials or brandy.

SUN COOKED PRESERVES.

This operation is best carried on in a glass house on the roof, or in an ordinary hothouse. Place selected ripe fruit with an equal weight of sugar in the jar or tumbler in which it is to be sold. Do not cover, but protect from insects by netting. Expose to the direct rays of the sun for a week or ten days until it thickens and partly jells; then seal the package and label. Do not use larger than an 8-ounce tumbler, 4-ounce is the preferable size. Wild strawberries are especially fine made by this process, and currants compare favorably with Bar-le-Duc.

PURE SUGAR AND FRUIT PRESERVES, MACERATION PROCESS.

Cook in tilting jacketed kettles. Provide a sufficient number of earthenware crocks or enameled pans of a capacity to hold 30 pounds (15 pounds fruit, 15 pounds sugar) for two days' run—also a number of 1-inch by 1-inch wooden strips a trifle longer than the diameter of the crocks or pans, to use in stacking.

Place 15 pounds prepared fruit mixed with 15 pounds sugar in pan and allow to remain 6 to 12 hours, or until the juice of the fruit has dissolved the sugar (with very dry fruit it may be necessary to add a little water, one or two ounces to each pan to start

the juice); then place in kettle and cook with little or no stirring until syrup drops in jelly from paddle. Dump in pan and set aside for a few minutes; then stir and set aside until cold; stir again and transfer to package; sterilize 1-pound jars 1 hour at 190 degrees.

HOME-MADE STYLE PRESERVES.

Proceed same as for maceration process, using three-quarters of a pound of sugar per pound of fruit; place in kettle and simmer gently until fruit is soft. Do not cook down; the syrup should be quite thin; divide the fruit among the jars; fill with syrup; seal and sterilize thirty minutes at 212 degrees for pints, and 1 hour for quarts. Use the ordinary "Mason" or similar family jar for this quality.

HOT PROCESS.

If from selected fruit and carefully cooked in small kettles, makes high grade for small packages; if from good fruit and cooked in 30 to 60 gallon kettles, makes high grade for large packages; if poor fruit cooked in large kettle is adapted for storing in half-barrels or barrels for use in apple juice and glucose goods.

Sterilize the glass goods: 1-pound 45 minutes at 190 degrees; pints, 45 minutes at 190 degrees; quarts, 90 minutes at 190 degrees.

Before filling in packages place on cooling table, and if for glass goods allow to set; if for large packages, cool to at least 160 degrees. Under-ripe fruits will present the best appearance; ripe or over-ripe will give the best flavor. Observe the same precautions in bleaching and hardening as given under canning of respective fruits. In using canned food cook only half the can liquor.

Apricots—Same as peaches, without paring.

Crab Apples—Take ripe crab apples, wash, place in kettle and cover with boiling water; simmer until skin comes off readily, then drain off water and remove peel; with a small-bladed knife cut out core from blossom end; do not remove stem; for each one hundred pounds prepared apples take fifty pints water and one hundred and twenty-five pounds sugar, place in kettle, bring to a boil, then drop in apples and cook slowly until syrup marks thirty-three degrees.

Blackberries—Cap the berries and wash if necessary; place in kettle with an equal weight of sugar, turn on steam and cook, without stirring, until syrup marks 33 degrees.

Cherries—Stem and pit red cherries, add an equal weight of sugar and put in kettle with the juice saved while pitting; cook until syrup marks 33 degrees.

Citron, Domestic—Prepare same as for candied citron; take of this, as it comes from the alum bath, one hundred pounds; cover with twelve and one-half gallons 25-degree syrup and cook down to 33 degrees; add the juice and yellow rind from two dozen lemons and one-quarter pound thinly sliced green ginger root.

Damsons—Same as plums.

Dewberries—Same as blackberries.

Gooseberries, Green—Run through a dry fruit cleaner and blow out chaff and leaves. To each one hundred pounds add one hundred and twenty-five pounds sugar and five gallons water; cook slowly until syrup marks 32 degrees.

Gooseberries, Ripe—Blow out chaff and leaves, and for each one hundred pounds add one hundred pounds sugar and four gallons water. Cook slowly until syrup marks 33 degrees.

Nectarines—Same as peaches.

Peaches—Cut in halves, remove stone, pare and cut into pieces of desired size; to each one hundred pounds add one hundred pounds sugar and one-half gallon water (or more if peaches are hard and dry); turn on steam and cook until syrup marks 33 degrees.

Pears—Select hard pears, peel, cut in quarters or eighths; remove stem and core, place in kettle, cover with cold water, and cook until tender; then add one hundred pounds sugar for each hundred pounds pears; add to kettle and cook until syrup marks 33 degrees. Cook soft pears same as peaches.

Pineapple—Peel, cut out all eyes and cores, cut in pieces of desired size; place in kettle with equal weight of sugar and cook very slowly until syrup marks 33 degrees.

Plums, Damsons, Gages, Etc.—Stem; place in kettle and for each one hundred pounds add one hundred pounds sugar and two and one-half gallons water; cook until syrup marks 32 degrees.

Quinces—Select ripe quinces; pare, core and cut into pieces of suitable size; place in kettle and cover with cold water; bring to a boil; then draw off water, cover again with cold water, and bring to a boil; then proceed as above directed and cook syrup to 33 degrees.

Raspberries—Cap and clean the berries, place in kettle with an equal quantity of sugar, bring slowly to a boil, and cook syrup to 33 degrees.

Strawberries—Same as raspberries.

Tomatoes, Green—One hundred pounds green tomatoes; three dozen lemons; fifty pounds sugar; one-half pound green ginger root. Slice the tomatoes, slice the lemons and remove seed; slice the ginger thinly; place the water in kettle and add all the other ingredients; turn on steam and cook slowly until syrup marks 32 degrees.

Tomatoes, Ripe—One hundred pounds ripe tomatoes, two dozen lemons, one hundred pounds sugar, one-half pound ginger root. Select very small, firm, ripe tomatoes; scald and peel; slice the lemons and remove seed; slice the ginger thinly; place all in kettle and cook gently until syrup marks 33 degrees.

Tomatoes, Yellow—Same as ripe tomatoes.

Watermelon Rind—Same as citron.

APPLE JUICE.

Apple Juice is "the thickener" used to improve the consistency and reduce the cost of pure sugar and fruit goods and with an admixture of glucose is the base of all 'compound" jams, jellies and preserves. Under normal conditions it is obtained most cheaply from dried or evaporated skins and cores, turned out as a by-product by nearly all concerns evaporating apples, and is termed "apple waste" or simply "waste." As a rule, the further north, or the greater the altitude in which the apples are grown, the greater the jelling power they possess. Sour or tart varieties of apples, harvested before they are entirely ripe, contain this principle in a more readily available state to a greater extent than sweet apples. Juice made from the waste of sweet or over-ripe fruit may be improved or developed to a certain extent by adding, in the kettle when boiling down, a small quantity of jelling acid, or old jelly. The lighter and brighter the waste, the lighter and brighter the resulting product. The finer and firmer the flesh of the waste, the clearer will be the product. In purchasing waste preference should be given to that recently made and containing a fair proportion of peelings from light-colored varieties of apples; the cores and the flesh side of the skin to be as little discolored as possible and altogether presenting a bright, clean appearance. When a portion of waste is soaked in cold water for a period of 12 hours the pulp should remain firm, and not become soft and mushy. A little experience will enable one to distinguish the difference between waste made from properly ripened and that from over-ripe fruit. It is very difficult, if not impossible, to economically make clear, brittle, sharp-breaking jelly from over-ripe waste.

When waste is received at the factory sample it thoroughly and if it does not run with a reasonable degree of uniformity either remove it from the packages and mix, or the packages containing the same grades be placed together and the cooker be charged with the different lots in proportion; do this in order to have the juice run uniformly for as long a time as possible.

When installing a plant it is advisable to provide cookers and press rather in excess of the proposed capacity of the plant: the initial cost is but little more and, if at any time found necessary, the setting up of additional kettles will greatly increase the output without the delay and extra cost involved in replacing the press and cookers.

COOKING.

There are various methods of cooking waste among which may be mentioned the diffusion process, a modification of the method used to extract sugar from cane and beets. This produces a fine juice, but is a complicated process requiring cumbersome and costly apparatus with close attention to make it at all successful. Vacuum pans, while they turn out a good, clear juice and do not occupy so much room are also costly and require skilled attention. The steam

percolation system, whereby the soaked waste is placed in a conical copper percolator and the juice forced out under steam pressure, is open to objection on account of cost and the danger of "burning" the juice if a pressure of 10 lbs. is exceeded, which is quite likely to happen if the operator gets in a hurry. Probably the best method is the one employing a cylindrical horizontal, copper boiler, slightly elevated at one end (say 1 ft. for a 6-ft. boiler) and containing perforated pipes inside to admit steam; at the lower, or discharge end place a 4-in. quick discharge valve at the lowest point, and at the top of the highest end place a large man hole with cover and clamps similar to a retort. A safety valve set at 10 lbs. must also be attached, and this pressure never exceeded. The process usually adopted is the open tank system where the waste is cooked with either open or closed coils in the bottom of wooden tanks. The closed coils will turn out a clearer juice than perforated coils, but are somewhat slower. Whichever system is adopted it is advisable to have two cookers, each with sufficient capacity to load the press, this being far preferable to one large cooker. There is always a difference in the jelling power and clearness of the juice which drains away and that which comes under pressure and if possible the entire pressing should be run into the juice tank before any is drawn in the kettles. The amount of water used in cooking waste may be varied from one gallon to one-half gallon per pound of waste, depending on the style of cooker and the use to which the juice is to be put. Of course the larger the amount of water, the more thoroughly the waste is exhausted and the easier to run out of the cooking tank on press, but this is counterbalanced by the extra time and steam required to reduce the juice to the jelling point. The proportions generally employed in the open tank with closed coil is a charge of 100 lbs. waste to 100 gals. water; with open tank and perforated pipes is 100 lbs. waste to 80 or 90 gals. water, depending on the temperature of the water, the idea being to finish the cook by having 1 lb. waste to 1 gal. water; place the waste in the cooker and add the requisite amount of water, allow to soak for the longest convenient period, then crack steam valve so it will heat up very slowly, when hot turn on full steam pressure and bring to a violent boil, cook for one hour, after which turn off steam and press. When the closed boiler is employed use 200 lbs. waste to 100 gals. water; place waste in, then add the water and soak, bolt down man hole, turn on steam and bring gradually to a pressure of 10 lbs. and hold there for 45 to 60 minutes. When the cookers are charged and allowed to soak over night, or for several hours, a less period of boiling may be given, cooking until the skins and pulp are thoroughly softened and done, but not cooked to a mush. For fine, light-colored

goods, if you have no juice made from fresh stock or apples, make juice by the same process from evaporated apples, chops or cuts if they can be procured.

When procurable, fresh raw waste as it comes from the machine replaces evaporated stock and may be cooked in the same manner though barely cover with water when cooked with closed coils and very little, or none at all, when cooked with open coils. When sound apples or windfalls can be procured at a nominal cost they may be chopped and treated same as fresh raw waste.

Any desired style of press may be used, knuckle joint, four screw or hydraulic, as preferred. Use cheese frames not more than 3 to 4 in. deep. After placing rack and frame, wet the cloth, spread and carefully fit to the bottom and corners; distribute the cooked waste evenly and fill all corners; fold cloth, pin, remove frame and place next rack and continue until loaded; the racks and cheeses must be exactly superimposed. When platform is loaded run under follower and apply pressure very slowly, stopping as soon as the juice runs freely; when juice nearly ceases running again apply pressure until it runs freely, then stop, and so continue until the cheese is sufficiently dry. If a very quick and continued pressure be applied, the outside of the cheese is likely to become dry and caked, thus preventing the free exit of moisture from the center; it will also force out more "mush" and consequently make a more cloudy jelly. With two cookers an average 10 hours' run is eight batches from the two, this allows about an hour's time for each pressing. After juice runs from press strain through cheese cloth or other suitable material. If very muddy run through felt or canton flannel filters. If necessary to have very clear, clarify with isinglass solution same as soup. The juice may be concentrated to, or near, the jelling point, and set aside for the sediment to subside, then draw or syphon off the clear liquid and filter the remainder, or use it for "butter" jelly.

The storage tank, receiving the juice from the press, should be of sufficient size to hold rather more than the full contents of one of the cookers. During the cooler months of the year there is little danger of fermentation taking place in the storage tank and pipes leading therefrom, though it is advisable to clean everything thoroughly for the Sunday shut down. During the hot months it is best to use, or at least boil down, all made juice and clean up every night. Fermented juice has very little jelling power and foams badly in the kettle.

It will not be surprising if the use of "apple waste" as now gathered from the apple evaporators is forbidden under the pure

food laws in the near futue. The reason for this is that much of it is dirty and contains the decayed portions of the apples. If made from clean parings of apples, there should be no objection to its use, provided these parings are cared for in a cleanly manner. Unless this is done, there is great likelihood of "apple waste" being condemned just as is pulp from "skins and cores of tomatoes."

PURE SUGAR, FRUIT AND APPLE JUICE PRESERVES.

Follow general method for hot process preserves, *using juice from press.*

Place the fruit in kettle and for each 100 lbs. add 6¼ gals. juice, bring to a boil and cook until the liquid marks 8 degrees, then add the sugar and cook until syrup marks 6 degrees less than degree called for by hot process; turn off steam and after all other ingredients are in add 1½ pints Tartaric acid coagulant.

Using concentrated juice, make same as hot process, cooking syrup to 6 degrees less than called for above. For each 100 lbs. fruit add 2 gals. concentrated juice and set with 1½ pints tartaric acid coagulant.

Using jelly, make same as hot process, cooking syrup to same degree. In a separate kettle make a 28-degree sugar and juice jelly and mix with the pure sugar goods in desired proportion. For each 60 lbs. jelly used add ¾ pint tartaric acid coagulant.

COMPOUND PRESERVES.

Sugar, Glucose and Fruit—To any of the pure sugar and fruit preserves add, in kettle after goods are finished and steam shut off, or with the syrup in candied fruits, the desired amount of 42-degree glucose. This may be added in addition to the sugar or may be substituted therefor pound for pound.

Sugar, Glucose and Fruit with Apple Juice from press, from fresh or canned fruit, following process for pure sugar and fruit with apple juice from press, of which this is an example:—

100 lbs. Fruit.
6¼ gals. Apple Juice.
50 lbs. Sugar.
50 lbs. Glucose.
1½ pints Tartaric Acid Coagulant.
4 oz. Preservative.
Color, sufficient.

Place the fruit in kettle, add the apple juice, cook to 8 degrees, add sugar and cook until syrup marks 6 degrees less than called for by hot process, turn off steam, add the glucose, color and preservative, then add the coagulant.

Using Concentrated Juice.—Make same as hot process, using but one-half the sugar and cooking to 6 degrees less, then add the glucose, concentrated juice, etc., in order.

Using Jelly.—Make same as hot process with one-half the sugar. In a separate kettle make 28-degree glucose jelly and add in desired proportion, set with tartaric acid coagulant.

From Hot Process Pure Sugar and Fruit, stored in bulk, using juice from press.

100 lbs. Pure Sugar Preserve.
6¼ gals. Apple Juice.
50 lbs. Glucose.
1½ pints Tartaric Acid Coagulant.
3 oz. Preservative.

Place juice in kettle, add the preserves, cook syrup to 6 degrees less than directed in hot process, turn off steam, add glucose, preservative, color and coagulant.

Using Jelly.—Place the sugar preserves in kettle, heat gently and mix with desired proportion of glucose jelly made in separate kettle; add preservative, color and coagulant.

JAMS

The U. S. Food Standards are:

Jam, marmalade, is the sound product made from clean, sound, properly matured and prepared fresh fruit and sugar (sucrose), with or without vinegar, by boiling to a pulpy or semi-solid consistence, and conforms in name to the fruit used, and in its preparation not less than forty-five (45) pounds of fruit are used to each fifty-five (55) pounds of sugar.

Glucose jam, glucose marmalade, is jam in which a glucose is used instead of sugar (sucrose).

Fruit butter is the sound product made from fruit juice and clean, sound and properly matured and prepared fruit, evaporated to a semi-solid mass of homogeneous consistence, with or without the addition of sugar and spices or vinegar, and conforms in name to the fruit used in its preparation.

Glucose fruit butter is fruit butter in which a glucose product is used in place of sugar (sucrose).

For making jams from fresh fruit in a large way an economical outfit is composed of a series of barrels, elevated on a platform each containing a large draw-off valve and copper coils in the bottom; the steam pipes are so arranged that the exhaust from the first coil discharges into the second coil, and so on through the series; a steam pipe is connected and carried around the outside of each barrel with valves so placed that one or more barrels may be cut out at any time without interfering with the rest of the series. This system is best adapted to straight sugar, or sugar and glucose goods. If it is desired to use apple juice, concentrate in a jacket kettle before adding.

American Style, Whole Fruit Jam.—The consistency of jams should be viscid rather than jellylike. For sugar, fruit and glucose, and for pure sugar and fruit the corresponding grades of preserves are generally used, though frequently boiled down 1 degree heavier with acetic acid or cream of tartar to prevent crystallization. *Grape jam* is an exception and is made by cooking to consistency 50 lbs. grapes, the juice of 100 lbs. grapes with 25 lbs. sugar and adding 2 oz. preservative.

For sugar, glucose, fruit and apple juice jams, cook same as preserves of like grade, but using double the quantity of juice and no coagulant.

For the cheaper grade of jams dilute hot process preserves with a special 30 to 32 degree jelly made by boiling the glucose down with the juice; if surplus juice, either from can or fruit, is available, substitute it for a part of the apple juice used in making the jelly.

MARMALADES.

English Style Jam.—Make the same as American style but wash and break the fruit by frequent stirring, or by passing through a sieve. The canned pulp, as directed under canning, is especially adapted for this class of goods. The following are exceptions to the general rule—

Grape Marmalade.—Pulp the grapes, reserving the skins; pass the pulp through a rotary pulper and place with the skins in kettle; for each 100 lbs. add 50 lbs. sugar and cook to consistency, stirring frequently; add 2 oz. preservative to each 100 lbs. of finished goods.

Orange Marmalade, Sweet.—Peel the oranges and cut the skin in straws; place in kettle and cover with cold water, bring to a boil and cook until tender, drain off the water; run the pulp through a rotary pulper, add an equal weight of sugar, place in kettle with peel and cook until syrup marks 32 degrees; for each 100 lbs. add 2 gals. concentrated apple juice.

Orange Marmalade, Bitter.—Peel bitter oranges and shred the skin, then handle same as above.

SPICED FRUITS.

Cherries, Pears, Plums, Quinces, Yellow Tomatoes, make same as hot process preserves adding, when sugar is put in kettle, for each 100 lbs. fruit 20 pints 60 grain vinegar in which has been previously cooked for one hour and then strained out, 10 oz. sliced green ginger root, 3 oz. whole cloves, 6 oz. whole allspice, 6 oz. Saigon cinnamon and 2 oz. whole mace.

FRUITS IN BRANDY.

Take fruit saturated with 30-degree syrup by cold process or with 33 degrees by candied fruit process, drain off all syrup, pack in bottles and cover with brandy. Allow to stand four weeks before marketing.

FRUITS IN CORDIAL.

Same as above, replacing brandy with cordial.

CRUSHED FRUITS FOR SODA WATER.

Peel, pit and prepare the fruit, pass through a meat chopper having a perforated plate with medium sized holes; to each gallon of this add 8lbs. sugar and 1 oz. Tartaric acid, place in kettle, heat to 190 degrees and stir until sugar is dissolved; to each 3 gallons of this add 2 oz. Japanese gelatin which has been soaked 6 hours in cold water and then dissolved by heat in a little water; stir well together (add color to produce desired shade and to each 100 lbs. of the product add 1 6-10 ozs. preservative). The cost may be reduced by replacing a part of the sugar with glucose.

FRUIT BUTTERS.

Cook fruit butters in a kettle provided with a mechanical stirrer and having a close fitting lid with shaft to carry off steam.

Apple Butter, Genuine.—Take cider fresh from the press and boil down one-half; place in kettle and for every 8 gallons add 1 bushel pared and cored apples, turn on steam and start stirrer, cook until a heavy, dark brown paste results, then add for each 100 lbs., ½ lb. ground Saigon cinnamon and ¼ lb. powdered nutmegs. No sugar is necessary. Finish by pasing through a pulper fitted with a fine perforated metal screen.

Apple Butter.—Cook in water, or steam, apples until soft, pass through pulper and place in kettle; turn on steam and cook until an almost solid paste results, then for each 100 lbs. add ½ lb. ground Saigon cinnamon, ¼ lb. powdered cloves, ¼ lb. powdered mace, 15 lbs. sugar and 35 lbs. glucose; when mixed and dissolved turn off steam and add 1 6-10th ozs. preservative. If color is not dark enough add caramel to darken. Finish in pulper.

Apple Butter from Dried Apples.—Place the apples in a tank with closed steam coil, cover with twice their weight of cold water and soak 6 hours, turn on steam and cook until soft, run through pulper and place in kettle; cook until nearly a solid paste; then for each 100 lbs. add ¾ lb. powdered cinnamon, ½ lb. powdered cloves, ½ lb. powdered Tartaric acid, 15 lbs. sugar, 35 lbs. glucose, and after dissolved and steam turned off add 1 6-10 ozs. preservative.

Peach Butter, Pure.—Take ripe or over-ripe, but not decayed fruit, remove stones and run through pulper, place in kettle, and for each 100 lbs. add 50 lbs. sugar, cook to a thick paste, and finish in pulper.

Peach Butter.—Make same as above, using a proportion of apples and sweetening with 15 lbs. sugar and 35 lbs. glucose.

Peach Butter from Dried Fruit.—Prepare pulp same as dried apples, cook same as peach butter.

Pear Butter.—Make same as apple butter, using no spice.

Plum Butter.—Run through pulper and cook same as peach butter.

Tomato Butter.—One hundred lbs. tomatoes, 25 lbs. apple pulp, 40 lbs. sugar, ¼ lb. Tartaric acid, 3 ozs. powdered ginger. Scald, peel and core the tomatoes; place tomatoes and apple pulp in kettle and cook to a stiff paste; then add the sugar and ginger, stir until dissolved, shut off steam and add preservative. Do not run this through a finishing machine; allow the seed to remain in the goods.

JELLIES

The U. S. Food Standards are:

Jelly is the sound, semi-solid gelatinous product made by boiling clean, sound, properly matured and prepared fresh fruit with water, concentrating the expressed and strained juice, to which sugar (sucrose) is added and conforms in name to the fruit used in its preparation.

Glucose jelly is a jelly in which a glucose product is used in place of sugar (sucrose).

Use wide, shallow jacketed kettles instead of the narrow, deep kettles, which are better suited to cooking than fast evaporation.

Do not process jelly, of any grade.

Cover the surface of jelly in packages with parchment paper moistened with a solution of preservative, or with anti-mould.

ANTI MOULD FOR CATSUP CORKS.

Hand Corking.

One gal. sulphurous acid, 11 gals. water, mix sulphurous acid.

ANTI MOULD FOR CATSUP,

Machine Corking.

One gal. boiling water, ¼ gal. benzoate soda.

After softening corks in hot water or steam, dip in above solutions before using.

ANTI MOULD FOR PRESERVES.

Dip parchment discs in 95 degrees alcohol.

If circumstances allow, do not cap tumbler goods until quite cold. If capped while hot moisture condenses between the jelly and the cover and favors the formation of mould.

Do not ship pail jelly until cold all through; if carefully handled they may be headed and stacked in 2 or 3 hours if necessary.

COAGULANTS OR JELLING ACIDS.

The jelling principle of all fruits is more plentiful in unripe fruits than in ripe fruits, as a portion of it undergoes a chemical change during the ripening. In its natural state it is freely soluble in hot and boiling water, and in combination with sugar or glucose in hot solution; on cooling it holds, or sets, the water forming a jelly; this is readily soluble in an excess of water; if melted and boiled for a time a chemical change similar to that in the ripening of fruit, takes place, and a syrup liquid results. In combination with sugar or glucose and an excess of strong vegetable acid it sets in much less time and in much hotter solution. This jelly is soluble in water. In combination with sugar or glucose, and a mineral acid it becomes insoluble and sets almost immediately even when in a very hot solution. This jelly is practically insoluble in water and when remelted will not set again. Owing to the insoluble substance formed on contact with mineral acid it will hold much water without parting with it ("bleeding" or "weeping") than when in its natural state, or with vegetable acids.

Use the following coagulants in proportion of ¾ pint to 30 lb. pail for hard jelly; or a half pint to a 30 lb. pail for a soft spreading jelly.

Tartaric Acid Coagulant.—Six lbs. Tartaric acid; 1½ gals. water. Mix and dissolve.

Acid phosphate, made by soaking good, clean bones in diluted sulphuric acid may also be used in same proportion.

GLUCOSE AND APPLE JUICE JELLY.

In the preserving line the articles having the largest sale, and generally returning the least profit, are the imitation fruit, or glucose and apple juice jellies, which occupy about the same position with the preserver that sugars do with the grocer.

Whenever the building will allow, the gravity system should be adopted, so that water and waste may be started at the top and finished jelly be drawn at the bottom without the intervention of a pump or the handling of glucose. This system will occupy a portion of 2 or 4 floors, according to the height of ceilings, and is arranged with cookers above the load height of the press (the press being on same floor with the glucose tank, if glucose is pumped, or with the glucose skids if barreled glucose is used), below the press is the juice storage tank, with pipes leading to the kettles, and below the kettles either a tank to receive the mixed jelly from kettle if it is mixed in the same kettle in which juice is boiled down, or a tank, containing a mechanical stirrer, in which to mix the glucose and concentrated juice. The jelly should not be filled into packages from the kettle, but be drawn off into another receptacle from where it can be filled while another batch of juice is being reduced in kettle. Fill the kettle

just above the jacket and apply the full steam pressure (see note*), so soon as the foam is "killed" using olive oil if necessary, and the juice has the proper "throw," open the valve of the supply pipe and allow the juice to run in, so slowly that the boil is not materially checked, until the kettle is sufficiently charged. Little time is gained by overloading, about three-quarters full usually giving the best results. When the juice is boiled down to about three-fourths of its bulk, gauge the quantity and take the gravity with a syrup hydrometer, carefully recording both results; at the same time mix four ounces, or other convenient quantity, of the juice with an equal quantity of glucose, and another portion with twice its bulk of glucose; cast both in tumblers with your regular coagulant. Proceed in this manner every few minutes, noting quantity in kettle, and gravity and casting samples until the hydrometer marks 14 degrees. From these samples of jelly it can be easily determined which is the best jelling fruit with both proportions of glucose; also which particular mixture and gravity will make the most satisfactory hard jelly for the grocery trade, and which the soft for bakers. These points decided, so long as the juice runs uniformly the jelly may be made without using the hydrometer by placing in the kettle each time the same amount of raw juice and boiling it down to a certain bulk, which will be determined by the gauge stick. In selecting soft jelly care must be taken that the first jelling point is not too closely approached. It frequently happens that jelly made in the winter, or during the cooler months, which apparently sets perfectly and is quite hard enough for shipment, will turn syrupy when stored in a warm place, or when subjected to summer heat. Jelly which has turned in this manner cannot be reclaimed in bulk with apple juice, but must be worked into fresh jelly by mixing in small quantities at a time.

When, instead of a sharp breaking, brittle, jelly, nothing can be produced but a tough, stringy, tenaceous mass, it indicates that the juice has been boiled down too hard, too much glucose used, or sweet or overripe waste. When it breaks properly but cannot be made hard enough it indicates not enough glucose, poor waste, or waste not sufficiently exhausted in cooking. In the case of sweet waste this can sometimes be overcome by boiling the juice down with a little syrupy jelly, or coagulant. Should this fail, make juice with one part of this waste to three parts of a good sour waste. Owing to the varying amounts of sugar and gummy matter contained in the skins no hydrometer or no simple chemical test will give the jelling power of juice; it must be tried practically.

*Note.—Steam pressure should be 70 to 80 lbs. for reducing juice. Never concentrate juice with a fast falling steam pressure: in order to get results pressure must be constant or rising.

After the juice has been concentrated to the proper density, turn off the steam, add the required amount of glucose and mix thoroughly; then add the color, preservative and flavor if used.

Never heat glucose to the boiling point if it can be conveniently avoided. Much of the glucose contains a certain amount of free acid and boiling may cause this to split up, a portion of it forming sulphuretted hydrogen in the goods which will completely ruin them for all purposes.

To cast jelly in pails, first rinse the pails with cold water, then place the required amount of coagulant therein and set on a perfectly level floor or platform. Draw off in a bucket or measure just sufficient jelly to fill a pail; pour in as rapidly as possible, without splashing, and at the same time, with a large spoon, stir first with a circular and then a circular up-and-down motion from the bottom; just before the jelly sets hold the spoon on the surface to collect the small bubbles and remove them. Tumblers and small pails may be filled by diluting the coagulant with an equal bulk of water and pouring in the jelly with a rush to thoroughly mix the two. Tumblers may be filled from a measure or vessel having a lip or spout, by mixing a smaller proportion of Tartaric acid coagulant with the jelly and pouring quickly before it sets. It must be, however, remembered that while the primary object of the coagulator is to make the jelly set quickly, it also prevents the finished article from "bleeding" or "weeping," and if too small a proportion is used there will be trouble from this. Care must be exercised that the coagulant is thoroughly mixed with the jelly and none allowed to float on the top.

It is the practice in nearly all factories with jellies of this grade to use no flavoring and no coloring for the light varieties, and but one shade of red for the dark kinds.

It is, however, advisable for the tumbler goods and a better grade of pail goods to either boil down with the apple juice some of the genuine fruit juice or to use a very small quantity, say ⅛ oz. to 100 lbs., of the appropriate ethereal flavor; also to use the proper coloring for each variety.

When a tough, spreading jelly is required for special purposes it may be made by boiling down the proper amounts of glucose and juice together, previously testing the glucose for free acid. It is, of course, necessary to know the jelling strength of the apple juice, and this can be ascertained by making jelly from it in the regular way and taking the density with hydrometer; then boil the mixed glucose and juice to correspond.

Sugar and Glucose Imitation Jellies.—Make same as glucose jellies, substituting the desired proportion of sugar for glucose.

Sugar and Glucose Jellies.—Make same as pure sugar jellies, substituting for the sugar the desired amount of glucose. For a cheaper grade use apple juice in all the pure jellies.

PURE SUGAR JELLIES.

Apple Jelly.—Take juice made from fresh waste, or entire apples; if not perfectly clear, pass through felt filters; place in kettle and bring to a boil; skim off all froth; add an equal weight of sugar (or 8 pounds per gallon), stir until dissolved; then boil continuously until it jells, which under normal conditions will be at about 32 degrees; keep well skimmed all the time; judge by placing a few drops on a cold surface, or by its drop from paddle. When sugar is first dissolved it will run syrupy from a paddle; at the next stage will "string," and at the next stage break from the paddle in drops. If desired a small proportion of tartaric acid coagulant may be added. Fill in tumblers and set aside to cool.

Cider Jelly.—Cider jelly is best made in a continuous evaporator built especially for the purpose. Take cider immediately from the press, bring to a boil, skim and filter; then evaporate until it jellies, which ranges from 28 to 34 degrees. Cider from tart apples will give the finest jelly; one pound of sugar to the gallon may be added.

Crab Apple Jelly.—Wash and chop the apples; allow 2½ gallons water to each 100 pounds; make juice, and handle same as apples.

Blackberry Jelly.—Put berries in kettle with a very little apple juice; heat slowly until berries are soft; express juice and filter; mix with an equal bulk of apple juice; then finish same as apple jelly.

Cherry Jelly.—Use pie or morello cherries, and make same as blackberry jelly.

Cranberry Jelly.—Place 100 pounds cranberries in kettle with 6¼ gallons apple juice; bring to a boil and cook 10 minutes; express juice and place in kettle with 50 pounds sugar; finish same as apple jelly.

Currant Jelly.—Select under-ripe currants, express juice, and filter through canton flannel, without squeezing; place in kettle and finish same as apple jelly.

Damson Jelly.—Make same as blackberry jelly.

Grape Jelly.—Make same as blackberry, but not using an equal bulk of apple juice.

Green Grape Jelly.—Stem the grapes, make juice and finish same as apple jelly.

Pear Jelly.—Make juice same as apple, add an equal proportion of apple juice, and finish same as apple.

Peach Jelly.—Stone the peaches, add a very little apple juice and a few peach kernels (or a drop or two Ext. Bitter Almonds), place in kettle and cook until soft; finish same as blackberry.

Pineapple Jelly.—Make juice same as currant, mix juice with an equal part of apple, and finish same way.

Plum Jelly.—Same as blackberry.

Quince Jelly.—Core the quinces; or cut and remove seed; make juice and finish same as apple.

If quinces are treated as elsewhere directed, utilize the water in which they were boiled and the peelings and cores, with all seeds removed, for jelly, handling exactly as raw apple waste.

Raspberry Jelly.—Same as blackberry.

Strawberry Jelly.—Same as blackberry.

Pure sugar jellies may also be made by placing the sugar with a very little water in a pan over open fire, and cooking the syrup to the "ball" or "crack" degree; then add the fruit juice and finish in the regular way.

FRUIT JUICES

Make the juice same as if for jelly, but using no apple juice; it may be filtered clear, or clarified and boiled with isinglass; or may be merely strained and left cloudy, as desired. It may be preserved in barrels, same as apple juice, or sterilized same as directed for grape juice. These juices are also put up in quart champagne bottles for soda fountain use either with preservative, or by placing the hot juice in bottles, sealing and processing 45 minutes at 212 degrees.

If the fruit is cleaned previous to pressing the pomace may be pulped and used as a filling for low grade jams or butters.

GRAPE JUICE.

Is used principally as a beverage. Select Concord grapes, crush between corrugated rollers set just far enough apart to avoid crushing the seed; place on press and express juice in the same manner as for apples; place the juice immediately in a kettle and heat to 190 degrees, then fill in 5-gal. glass demijohns, which have been sterilized in a steam box, cork and place on racks in a dark cellar. The cork should be covered with a circle of raw cotton (cut with a die from ordiary cotton batting) and this in turn with a smaller circle of pure tin foil; force the cork in until the foil is below the lip of 'john. After standing for greater or less length of time the sediment in the juice will subside, and when the line of demarcation is sharply defined the clear liquid may be syphoned off, placed in kettle, with sugar and water added if desired, and brought slowly to a temperature of 180 degrees, then place in bottles for sale, sterilizing half-pints 45 minutes, pints 60 minutes and quarts 75 minutes at 190 degrees. Put the sediment remaining, in kettle, heat to 190 degrees and fill the 'johns full, corking as at first. Continue this operation as the juice separates until finally a nearly solid mass, containing a large proportion of crude cream of tartar or argols remains. Press and dry this and sell to a manufacturing chemist.

SECOND METHOD.

By a second method the grapes are crushed and placed in a large tank; in a short time the juice will separate and can be drawn off at the bottom, place this in kettle, bring to a boil, cook 2 or 3 minutes, then add 4 ozs. preservative to 50 gals. It may be cleared by the previous method or by filtering. To the grapes remaining in tank add water and sugar equivalent to the juice drawn off, then press and turn into wine. Do not put grape juice in barrels unless they are paraffined.

THIRD METHOD.

There are several methods of making Grape Juice as given above, but the following appears to give the best results: Stem the grapes, place in jacket kettle or tank with closed copper coils—bring to a gentle simmer, then place on press; strain the resulting juice through bagging and place in jacketed kettle—heat to not more than 190 degrees and filter through canton flannel. After filtering again place in kettle and heat to not more than 180 degrees—fill into sterilized bottles, cork and seal immediately. A modification of this is to fill into bottles after the filtering and process at not over 180 degrees. Add Sugar, if necessary, after filtering.

FRUIT SYRUPS FOR SODA FOUNTAIN

In each gallon of fruit juice dissolve 15 lbs. sugar, either by heat, in which case it may be clarified with isinglass solution, or by cold agitation. To each gallon add 1 oz. powdered citric acid and sufficient color to produce the desired shade. Preservative may be added, or the packages sterilized.

Orange Syrup.—Cut the orange in half, express and strain the juice; mix with an equal bulk of water in each gallon of which has been dissolved 8 ozs. citric acid; dissolve 15 lbs. sugar in each gallon by agitation; do not use heat; if the syrup is intended for immediate consumption it may be flavored with 1 oz. soluble extract of orange, or by paring off the outside yellow rind, rubbing it in a mortar with a portion of the sugar. If kept for any length of time the oil, so used, will turn turpentiney. Color slightly with yellow or with blood orange color.

Lemon Syrup.—Same as orange.

Vanilla Syrup.—Make simple syrup, 15 lbs. sugar to 1 gal. water, by heat, and clarify; when cold add to each gallon 2 ozs. extract vanilla and tint slightly with caramel.

Raspberry Syrup, Fermented.—Crush the raspberries and set in a warm place until fermentation commences, then express juice and make in the regular way.

Raspberry Vinegar.—To each gallon of fermented juice add an equal quantity of 60-grain vinegar (genuine cider vinegar of good quality if it can be procured), and dissolve in it, by agitation, 16 pounds of sugar.

CORDIALS.

Curacoa Cordial.—One pound outside yellow rind of orange, one-half pound ground bitter orange peel, one-half ounce ground Saigon cinnamon, one-quarter ounce nutmegs, two gallons 95 per cent. alcohol. Soak two weeks; filter off liquid and add to it seven and one-half pounds sugar dissolved in one-half gallon of water. Add a trifle of blood orange color to tint if necessary.

Maraschino Cordial.—Twenty-nine gallons 95 per cent. alcohol, two drams extract bitter almond, one-half pint raspberry syrup, one-half pint orange flower water (Chiris), seven and one-half pounds sugar, one-half gallon water.

Mix alcohol and extract bitter almond; dissolve sugar in water; add orange flower water and raspberry syrup; then mix all together.

PUDDINGS.

Plum Pudding, Fancy Grade.—Twenty pounds currants, twenty pounds seeded Muscatel raisins, twenty pounds suet, fifteen pounds bread crumbs, five pounds sugar, two pounds candied lemon peel, five pounds candied orange peel, five pounds flour, one-quarter pound of powdered nutmegs, eight dozen eggs, six gallons brandy. Dry clean the currants; clean and chop suet fine; chop orange and lemon peel very fine; mix all dry ingredients together; beat the eggs and mix with the brandy; then mix thoroughly with other ingredients; pack in cans, cap, tip and process; quarter-pound cans, one and one-half hours at 240 degrees; one-half pound cans, two hours at 240 degrees; one-pound cans, two and one-half hours at 240 degrees; two-pound cans, three hours at 240 degrees; four-pound cans, four hours at 240 degrees. The brandy may be replaced by three gallons alcohol, one gallon fruit juice and two gallons water, mixed.

Plum Pudding, Choice.—Fifteen pounds bread crumbs, five pounds flour, ten pounds seeded Muscatel raisins, two pounds candied lemon peel, two and one-half ounces Tartaric acid, ten pounds currants (dry cleaned), ten pounds brown sugar, two ounces powdered Saigon cinnamon, one ounce powdered nutmegs, ten pints molasses, two and one-half dozen eggs, ten pounds chopped suet, one and one-half ounces baking soda.

Mix well all dry ingredients except Tartaric acid and soda. Dissolve the acid in a little water and mix with the molasses; beat eggs and add to molasses; dissolve the soda in one-half pint of boiling water and mix with the molasses; add to dry ingredients and make a paste; pack in cans, cap, tip and process same as above.

Plum Pudding.—Twenty pounds suet, twenty pounds currants, sixteen pounds flour, ten pounds bread crumbs, twenty pints molasses, five ounces tartaric acid, twenty pints apple pulp, one-half pound salt, four ounces ground Saigon cinnamon, four ounces baking soda.

Add the Tartaric acid and apple pulp to the molasses, then the soda, and make a paste with the other ingredients previously mixed.

Rice Pudding.—Fifteen pounds rice, fifteen pounds sugar, ten pounds raisins, forty gallons milk.

Clean and seed raisins; wash the rice with cold water; place the milk in kettle, add half the rice and cook thirty minutes; then add balance of rice and cook thirty minutes; divide the raisins among the cans; fill with the cooked rice; cap, tip and process; three-pound cans, fifty-five minutes at 250 degrees.

Fruit Pudding.—Twenty pounds corn starch, forty pounds sugar, five pounds dried fruit, three-quarters of a pound salt.

Cover the fruit with cold water and soak six to eight hours; drain off water and run through pulping machine; then mix with the corn starch; then add the sugar and salt and thoroughly incorporate; spread the resulting mixture on trays and place in drying room; when dry reduce to a powder and pack in boxes.

Twenty pounds tapioca may be substituted for the corn starch; and fifteen pounds of fresh or canned fruit drained free from juice may be substituted for the dried fruit; the powder may be made into a mass with glucose and packed same as condensed mince meat.

MINCE MEAT.

It is not advisable to process mince meat, as the suet will separate and form a solid cake when cans cool.

If the mince meat is prepared with 1 6-10th ozs. benzoate soda to each 100 lbs., or sufficient alcohol is used, it may be canned without processing.

Wet mince meat, even of the best quality, when handled in the ordinary commercial way will not keep without the use of preservative. If the use of benzoate is abandoned there appears to be no alternative except the excessive use of alcohol to the extent of at least 6 per cent. for safety. Alcohol 95 per cent., neutral or cologne spirits, brandy, wine, whiskey or rum may be used on this basis; that is, 6 per cent. absolute alcohol.

Use good tart apples, free from decay; chop moderately fine; if it is desired to have the apples show white in the finished meat, throw in a solution of one ounce sulphite soda to five gallons water as soon as apples are pared, and keep wet with the syrup while chopping; if apples are sweet, add enough Tartaric acid to make snappy. Wash and clean the seedless raisins and currants, hand picking to remove stones; clean, stem and seed raisins. Chop the orange and lemon peel very fine; and the citron coarse. Select good, fresh, firm suet; trim out all kernels, meat, bloody parts and the larger strings; chop fine and run through a coarse sieve to remove the small strings. Suet may be thoroughly chilled and run through any of the "plate" choppers (using the small holes), but while it saves time and suet, the mince meat will not present so fine an appearance. Meat as

cooked by many simply forms a tasteless and expensive filling. To cook meat properly it must be first plunged in a *boiling hot* solution of salt (three pounds of salt to twelve and one-half gallons of water); then changed to a 1 per cent. solution, where the cooking is finished; trim out all fat and gristle and chop quite fine.

Meat is seldom used, except in a few special grades. For the cheaper mince meats it is not necessary to either pare or core the apples; core for the medium grades, and both peel and core for the best grades.

A convenient size box is made of two-inch stuff, two inches wide at bottom, two feet eight inches deep, and of any desired length. In mixing always first mix the apples and suet; then spread out over the bottom of box and add the other dry ingredients in even layers: turn over with shovel, add the syrup, turn over again, then allow to soak twenty-four hours, or long enough for the fruit to swell out plump; then mix again and put in packages. If it has to be put in packages without the twenty-four hours' soak, steam the currants and raisins. If dried or evaporated apples are used, chop very finely and use one pound of apples and two pounds of water for three pounds of raw apples.

Coat all soft-wood packages with melted paraffine wax, or shellac varnish. Place a notice on packages requesting the dealer to stir and dip from the bottom every time any of the contents is removed.

Fancy Mince Meat.—Twenty pounds cooked beef, forty pounds sultana raisins, one hundred and sixty pounds currants, forty pounds Muscatel raisins, twenty-five pounds suet, twenty pounds citron, ten pounds orange peel, five pounds lemon peel, four hundred and eighty pounds apples (cored and peeled), twenty gallons syrup, six pounds salt, three-quarters of a pound ground Saigon cinnamon, one-half pound ground cloves, one-quarter pound ground nutmegs, two gallons spirits, and one and one-quarter pounds preservative. To cheapen this, add more apples, making no other change than to slightly increase the amount of spice and syrup. Brandy or other spirits may be replaced by alcohol and fruit juice mixture, as for plum pudding.

Standard Mince Meat.—Twenty-five pounds sultana raisins, twenty-five pounds Muscatel raisins (seeded), fifteen gallons brown sugar syrup, three pounds salt, three-quarters of a pound Saigon cinnamon, one-quarter of a pound of nutmegs, one gallon spirits, one pound preservative.

Mince Meat, Second Grade.—Forty pounds raisins, sixty pounds currants, fifteen pounds suet, four hundred pounds apples, ten gallons molasses, one pound ground cloves, two pounds salt, three-quarters pound preservative.

Dry or Condensed Mince Meat.—This is a mixture of dried fruits and spices made into a mass with a paste of flour and molasses and, unless made in very small batches, requires a power dough machine to properly mix. The composition can be varied

nearly as much as the ordinary or wet mince meat, but enough flour must be used to form the mass properly and make the mixture thick enough when it is prepared for pouring in crust. Water may be used to assist in forming the mass, but if any considerable quantity is used it will dry out and leave a hard, solid cake that is not easily managed by the consumer. When properly made it will remain soft and moist for an indefinite time.

In summer unless placed in cold storage, it is apt to become wormy; this, to a certain extent, can be obviated by thoroughly steaming the currants and raisins before mixing.

Prepare the fruit same as for wet mince meat; steam the currants and raisins; dip the apples momentarily in cold water, and chop very fine. Start the machine and first place therein the sugar, then the flour, followed by all the other dry ingredients, then add the apples and the balance of fruit; when well mixed add the molasses and caramel previously stirred together; after the molasses is in it will require but a few turns of the arms to make a mass. If it does not, add a very little water (one or two pints to a batch), turn out of machine, form in cakes or bricks, wrap in waxed paper, and place in paper boxes.

First Grade Dry Mince Meat.—Eighty pounds dried apples, twenty pounds evaporated apples, twenty pounds Muscatel raisins, ten pounds sultana raisins, fifteen pounds currants, five pounds candied citron, two and one-half pounds orange peel, forty pounds "A" sugar, twenty pounds rye flour, three pounds salt, one and one-half pounds powdered tartaric acid, two pounds powdered Saigon cinnamon, three-quarters pound powdered cloves; one-quarter pound powdered nutmegs, four gallons molasses, four pints caramel.

Medium Grade Dry Mince Meat.—Eighty pounds dried apples, ten pounds Muscatel raisins, ten. pounds sultana raisins, fifteen pounds currants, two and one-half pounds candied citron, thirty pounds brown sugar, fifteen pounds rye flour, three gallons molasses, three pints caramel, one pound ground Saigon cinnamon, one-half pound ground cloves, two pounds salt, one pound powdered tartaric acid.

Second Grade Dry Mince Meat.—One hundred and twenty pounds dried apples, twenty pounds Muscatel raisins, ten pounds currants, forty pounds brown sugar, twenty pounds flour, two gallons molasses, two pounds glucose, one pound ground Saigon cinnamon, one pound ground allspice, five pints caramel, three pounds salt, one and one-half pounds powdered tartaric acid.

PIE FILLERS.

Orange Meringue Pie Filler.—Eighteen gallons water, 25 pounds corn starch, 2 ounces carbonate soda (powdered), 60 pounds sugar, 240 pounds glucose, 6 dozen eggs, 3 dozen oranges, 2 pounds powdered tartaric acid, 4 ounces oil of orange, 4 ounces 95 per cent. alcohol.

Grate off the outside yellow rind of the oranges and mix with the expressed juice; mix the oil of orange and alcohol; beat the eggs. Place the sugar in kettle, having a mechanical stirrer, with the corn starch and carbonate of soda; mix thoroughly; then add the water and 100 pounds of the glucose; turn on a full head of steam and bring to a boil; when the starch "sets" cut steam down and cook five minutes, then shut off the steam and add the beaten eggs, when well mixed add the remainder of the glucose; mix and turn out on cooling table; when temperature has fallen to about 110 degrees, add the rind and juice of oranges, the tartaric acid, the mixed oil and alcohol, and thoroughly incorporate; then run in pails and cover surface with parchment paper.

When first made this filler will have a smooth, translucent appearance, but on standing a few days will assume a granular appearance.

Should it separate with age, drain off the syrupy liquid and mix with one-half pound corn starch for each pail, place in kettle and bring to a boil, run the solid portion through a pulper and mix with contents of kettle, place in pails and sell for quick consumption. In making future batches increase your starch by this amount (35 pounds instead of 25 pounds). When you have found a starch that will stand, never change. If using chemicaled starch do not use the carbonate soda.

It is advisable to do considerable experimental work on pie filler before placing on the market. Obtain several samples of starch, and make small batches, one-tenth or one-twentieth of the formulae, using different starches and different proportion; place in pails and set in a warm place for several weeks, examining them frequently and noting appearance. Mark the sample number on side of pail, not on lids, as the lids frequently get misplaced.

Ground dried orange peel, soaked in water, may be used instead of the grated peel from fresh fruit; the mixture may be cooked in a tank with perforated coils by making due allowance for the condensed steam.

Lemon Meringue Pie Filler.—Make exactly the same as orange, using the grated orange peel and juice same as for orange, but use oil of lemon instead of oil of orange, and the appropriate lemon yellow color.

Fruit Meringue Pie Filler.—Nine gallons canned fruit (juice and all), 9 gallons water, 25 pounds corn starch, 60 pounds sugar, 240 pounds glucose, 6 dozen eggs, 1½ pounds powdered tartaric acid. Mix the sugar and corn starch, add the canned fruit and water with half the glucose, cook same as orange; turn out on cooling table; when cool add the acid.

Fruit Pie Filler.—Make a cheap glucose, sugar and apple juice preserve or jam, using tartaric acid coagulant.

Crystallized Fruit Pie Filler.—Make same as fruit pudding, and add to it 5 pounds of dried fruit (if apricots, peach, apple, etc., chop moderately coarse), which moisten with heavy syrup; roll in granulated rock candy and dry before mixing with the powder.

Pumpkin Pie Filler.—One hundred pounds pumpkin pulp from machine, 10 pounds sugar, 2½ pounds corn starch, 5 pounds butter, 1 pound salt, ¼ pound ground mace, ¼ pound ground cinnamon, ½ pound ground ginger, ½ gallon Jamaica rum.

Place the butter in kettle, add the pumpkin, salt and sugar, heat to about 180 degrees, then add the other ingredients mixed with the rum; mix well, place in cans, cap, tip and process: 3-pound cans 20 minutes at 240 degrees.

If to be put in pails, bring to a thorough boil before adding the rum, and add 3 ounces preservative to each 100 pounds.

Condensed Pumpkin Pie Filler.—Take pumpkin pulp as it comes from the machine, put on press and express all the liquid possible. Seventy-five pounds pressed pulp, 10 pounds sugar, 10 pounds flour, 2 pounds salt, ¼ pound ground mace, ½ pound ground cinnamon, ½ pound ground ginger, 2 gallons glucose. Place the pumpkin in dough mixer, add all the dry ingredients and mix thoroughly, then add the glucose and make a paste, form in blocks same as dry mince meat.

Cranberry Sauce.—One hundred pounds cranberries, 100 pounds sugar, 7 gallons apple juice, 5 to 15 gallons glucose. Place the berries and juice in kettle, bring to a boil and cook ten minutes, then add the sugar and cook 25 to 30 minutes or until syrup jells. Shut off steam and add the desired amount of glucose. All soft wood packages should be coated with shellac or other substance of like nature.

CATSUPS.

Cucumber Catsup.—Forty gallons cucumber pulp, 10 gallons vinegar, 10 pounds salt, 20 pounds ground horse radish, 1¼ pounds ground cayenne pepper, 10 ounces preservative. Select ripe cucumbers, peel and run through pulper. Put all ingredients, except horse radish and preservative, in kettle, cook to a thick sauce, turn off steam and add the horse radish and preservative. Bottle while hot.

Mushroom Catsup.—Pack 100 pounds mushrooms in a barrel, with alternate layers of salt, using 5 pounds of salt to the 100 pounds. Stand in a very warm place for 24 hours, then crush mushrooms and express the juice; place the juice in a kettle and simmer for 15 minutes, then for each 5 gallons of the liquid add: 1¼ pounds crushed black pepper, ¼ pound crushed allspice, ½ pound sliced green ginger root, ½ ounce whole mace, 2 ounces of whole cloves. Cook 15 minutes longer, strain and bottle while hot.

Tomato Catsup.—Fine catsup depends for its goodness and flavor on the quality of the pulp; the spices being selected and added in small proportion with the intention of accentuating the tomato flavor, not disguising it.

Cook the high-grade goods in small batches, using not larger than 60-gallon kettles; for the cheaper grades, kettles up to 250 gallons may be used.

Home-made style is best made with moderate steam pressure in tanks fitted with copper coils.

The tomato flavor is best retained by cooking with either a very high or low steam pressure. Cook all regular goods with high pressure, but when working pulp, no matter if it is heavy and does not require it to bring to the proper consistency, an actual boil of not less than 30 minutes must be given to assure freedom from future fermentation. Usually 100 gals. pulp from the machine, or 66 to 70 gallons of prepared pulp will make 50 gallons finished catsup of the proper consistency. It is cooked properly when a small quantity, placed on unglazed paper, gathers in a globule, flattened at the base with no water separating, and remaining on the paper for some considerable time before the paper is dampened on the reverse side.

When using pulp salted at the time of making, deduct the amount of salt from the quantity called for by the formulæ.

Sweet pulp made from table waste (unsalted), when boiled to catsup consistency contains 7 per cent. dry matter and at 60 degrees the percentage of water added and specific gravity are given in the following table:

WATER.	SPECIFIC GRAVITY.
5 per cent	1.0365
10 per cent	1.0347
15 per cent	1.0325
20 per cent	1.0315
25 per cent	1.0300
30 per cent	1.0285
35 per cent	1.0275
40 per cent	1.0265
45 per cent	1.0255
50 per cent	1.0245
55 per cent	1.0230
60 per cent	1.0227
65 per cent	1.0215
70 per cent	1.0195

Unless otherwise directed, use crushed spice with all dust sieved out, and chop the onions and garlic very fine; separate them from the cooked catsup either with a "shaker," or with a rotary pulper fitted with a very finely perforated metal plate; the very finest sieve on a rotary pulper will not give the results obtainable with perforated metal sheets.

There are good catsup finishing machines on the market, and large manufacturers of catsup highly endorse the work they do, and would not attempt to work without them.

If not provided with a finishing machine, tie the spices, onions, etc., with a stone or weight in a double cheese-cloth bag and allow double the cooking time.

Whole spices may be used directly in the pulp by allowing double the cooking time for crushed spices.

To make a finished catsup to contain 1-10 of 1 per cent. of benzoate of soda from bulk pulp previously prepared with 1-10th of 1 per cent. of benzoate of soda use a sufficient quantity pulp free from preservative to make up the loss by evaporation in cooking to consistency. For instance if three barrels of pulp will make two barrels of finished catsup, one barrel of the pulp must be free from preservative which practically means that one-third of the pulp must be from canned, cold storage or heavily salted goods.

In some localities the addition of the salt required in the finished article to one barrel of pulp will keep it, and on the above basis will produce the desired result.

Properly made catsup, and that means in addition to the right cook that perfect raw stock be used, containing no benzoate of soda may be bottled without a final processing if the following precautions are strictly observed; the bottles to be first washed, then sterilized either in steam or hot air—the catsup filled in the still hot bottles at a temperature of not less than 180 degrees and stoppered immediately. The keeping of all apparatus in a sanitarily clean condition is quite as important as the filling at 180 degrees.

To make tart catsup, follow any of the formulæ, reducing the amount of sugar and increasing the vinegar.

To better preserve the flavor of catsup, bottle while hot; fill bottles to overflowing, and dip the softened corks in anti-mold before using.

Process bottled catsup, containing no preservative, ½ pints 30 minutes and pints 45 minutes at 212 degrees.

Fancy Grade Sweet Catsup.—For some time past numerous complaints have been made that where high-grade sweet catsup is made direct from tomatoes and placed immediately in bottles, none of the ordinary preservatives was sufficient to prevent a greater or less amount of loss by fermentation. From investigations made, this appears to be caused by the development of spores, which were lying dormant when the cooking (which killed all native bacteria) was done, and which developed by the moderate heat before the goods cooled off. This can be prevented either by giving the catsup a partial cook at first, stopping just short of the time for adding the vinegar, turning out of the kettle, cooling to 50 or 60 degrees and storing in barrels or tanks for 24 hours; then replace in kettle, bring

to a boil and finish in the regular manner; or, the catsup may be first finished in the regular way, placed in bottles and at the expiration of 36 or 48 hours, process for the regular time at 212 degrees.

Take fifty gallons pulp from machine, 3 gallons 60-grain vinegar, 15 pounds sugar, 5 pounds salt, 5 pounds onions, ½ pound garlic, ¼ pound cayenne pepper, ½ ounce bay leaves, 1 ounce powdered Saigon cinnamon.

Place the pulp from machine (or its equivalent in boiled-down canned stock) in kettle with the finely chopped onions and garlic; bring to a boil. When the cook is about half completed add the salt, sugar and cayenne pepper; when within 10 minutes of the finish, add the cinnamon; then when completed, turn off steam, and run through finishing machine.

While the spicing and cooking as above is simple, it is quite easy to entirely change the character of the finished goods by varying the time for which the spices are cooked and by slightly changing the spicing. The onions are directed to be cooked from the first; by putting them in when the cook is half completed, an entirely different flavor is secured; and if cooked for only two minutes, still another flavor. The long cook gives a much better flavor to the catsup than the shorter cook, while the last cook of two minutes gives a better odor. By using double the quantity directed, and cooking one-half from the first, and giving the balance a two-minute cook, both results are obtained and the catsup improved thereby. The similar treatment of bay leaves also produces considerable difference, though not so decided as with the onions; allow a cook of thirty minutes instead of ten; more than thirty will give a woody flavor and is not desirable.

The cinnamon may be doubled in quantity and a cook of two minutes given instead of five, and a still more delicate flavor will result. The Saigon cinnamon may be replaced with double the quantity of Ceylon cinnamon in the quill; this may be given a cook not to exceed four minutes and removed immediately on expiration of the time, or a barky flavor will result.

Bay leaves may be replaced with half their quantity of ground mace or crushed nutmegs.

Varying the amount of sugar and vinegar will make a considerable change on the same principle that one lemon and plenty of sugar will make a better lemonade than a half lemon and a small quantity of sugar. The vinegar used must be the best obtainable, a full, fine-flavored cider vinegar from sound apples, if procurable.

Oyster Cocktail Catsup.—Forty gallons pulp (canned stock), 3 gallons 60-grain vinegar, 2 pints Worcestershire sauce, 10 pounds salted, ripe bull-nose peppers, 10 pounds sugar, 6 pounds salt, 6 pounds onions, 1 pound garlic, 3 pounds West India peppers, 2 ounces ground Saigon cinnamon.

Freshen and chop fine the peppers and place in kettle with the chopped onions, garlic, West India peppers and pulp; cook rapidly, and when cook is half done, add sugar and vinegar; when within five minutes of the finish add the cinnamon; when completed, turn off the steam and add the sauce; then finish in a rotary machine.

Home-Made Style Catsup.—Forty gallons pulp from machine, 5 gallons vinegar, 10 pounds onions chopped very fine, 5 pounds salt, 5 pounds sugar, 1 pound ground black pepper, 1 pound ground allspice, 1½ pounds ground yellow mustard, ¾ pound ground ginger, ½ pound ground cloves, 2 ounces cayenne pepper, 1 gallon alcohol.

Place all the ingredients except the vinegar and alcohol in kettle or tank with copper coil, cook very slowly until reduced; turn off steam and add the alcohol. If it is not a good brown color add sufficient caramel to produce the desired shade. Place in bottles and sterilize. Do not pass this catsup through a finishing machine; the onions must be very finely chopped or grated.

High-Grade Sweet Catsup.—Forty-five gallons pulp, 3 gallons 60-grain vinegar, 15 pounds sugar, 5 pounds onions, 1 pound garlic, 5 pounds salt, ¼ pound cayenne pepper ground, ½ pound white pepper ground, 2 ounces Saigon cinnamon ground, ½ ounce mace. Use *canned steam-separated* pulp from entire tomatoes, or boiled-down pulp; cook same as Fancy Sweet Catsup, adding the white pepper and vinegar together; add the mace and cinnamon five minutes before the finish of cook.

Medium-Grade Sweet Catsup.—One hundred gallons pulp from machine, 3 gallons vinegar, 15 pounds sugar, 10 pounds salt, 5 pounds onions, 6 ounces ground cayenne pepper, 4 ounces ground white pepper, 4 ounces cloves, 2 ounces allspice, 2 ounces Saigon cinnamon, 1 ounce nutmegs.

Place the pulp, salt and sugar in kettle; when within ten minutes of the finish, add the vinegar and spices, which have been previously mixed; add the finely chopped onions two minutes before the finish.

Standard-Grade Sweet Catsup.—One hundred gallons barrel pulp, 5 gallons vinegar, 25 pounds sugar, 10 pounds onions, 12½ pounds salt, ½ pound ground white pepper, 10 ounces cayenne pepper, 4 ounces yellow mustard, 10 ounces powdered ginger, 2 pounds Saigon cinnamon, 2 ounces cloves, 2 ounces allspice. Cook same as preceding formula.

Second-Grade Sweet Catsup.—Two hundred gallons barrel pulp, 4 gallons vinegar, 25 pounds salt, 20 pounds sugar, 12 ounces ground cayenne pepper, 10 ounces coriander seed, 10 ounces ginger, 6 ounces allspice, 6 ounces cloves, 3 ounces Saigon cinnamon.

Cook same as medium grade.

Worcestershire Sauce.—Fifty gallons water, 9 pounds anchovies, 14 pounds tamarinds, 4 pounds dried mushrooms, 2 pounds ground Foemgreek seed, 6 pounds salt, 5 pounds chopped garlic, 10 pounds roasted onions, 1¾ pounds cayenne pepper, 2½ pounds whole cloves, 1½ pounds bruised ginger, 2 ounces oil lemon, acetic acid sufficient.

Place all the ingredients except the oil of lemon and acetic acid in kettle, bring to a boil and cook slowly one hour. Turn off steam and add 3 gallons acetic acid or sufficient to make the vinegar strength 35 grains; then add the oil of lemon and place in a wooden package to ripen. This is a close imitation of the genuine, but requires 2 to 12 months to properly ripen.

TOMATO KETCHUP UNDER THE MICROSCOPE;

With Practical Suggestions to Insure a Cleanly Product.

By B. J. Howard,

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INTRODUCTION.

The various products manufactured from tomatoes are becoming more and more important commercially from year to year. Those who have watched the industry during the past 5 or 10 years have noted radical changes in some of the manufacturing methods which tend to produce a cleaner and more wholesome product. Especially is this true of the manufacture of ketchup. Some manufacturers, however, are still producing their product under conditions which show a lamentable lack of care, and are making themselves liable to prosecution and their products to condemnation. It is, however, the writer's opinion that much of this is the result of ignorance as to the influence that certain methods of handling exert upon the character of the product. It is for the purpose of giving the manufacturer the benefit of certain practical results of laboratory and factory investigations of the various methods of handling these products that this circular is written. It is not intended to deal with the subject exhaustively, nor to present the detailed micro-analytical data on which the conclusions are based, but rather to give the practical deductions of the investigations and the reasons for the same in a manner that will be clear to the manufacturer, who may not have a technical education. To this end some points which may be used to advantage by those engaged in the manufacture of such products will be emphasized and some of the pitfalls which beset the manufacturer indicated.

Nature of Decay.

Under the food and drugs act, June 30, 1906, a food product is deemed to be adulterated "if it consist in whole or in part of a filthy, decomposed, or putrid animal or vegetable substance." Decay or putrefaction in tomatoes is commonly the result of the attacks made by various forms of plant life upon the fruit or upon the partially manufactured product. Among these, yeasts, bacteria, and molds of various species are the most common. They feed upon certain compounds in the tomato, reducing the food value of the product, producing by-products of a more or less offensive character, and usually modifying the characteristic flavor of the product. They may attack the fruit on the vine before picking or at almost any of the various steps of manufacture, and if the conditions for preservation are not right they may infect and cause spoilage in the finished product. Among the forms most liable to attack the fruit on the vines are some species of molds. One of the most familiar molds, both to the farmer and to the manufacturer, results in the production of "dry" or "black rot." Some others appear as white growths on the fruits and usually develop after the fruit has been taken from the vines, entering through cracks or fissures in the skin of the fruit. This also occurs in the entrance and growth of yeasts and bacteria. If the temperature conditions are favorable the development of yeast and bacteria in the raw flesh of the tomato or in the raw partially manufactured product is very rapid, and the rate of growth increases tremendously when the hosts are stored in close, warm quarters. Good ventilation tends on the other hand to retard such growth. The decomposition products due to these organisms appear to be much the same whether the growth occurs on the whole fruit, in the pulp, or in the stored product. Boiling may arrest the growth for a few hours, but if the product is not shielded from fresh infection, the benefit thus derived is only temporary, for it is the common knowledge of many manufacturers that tomato pulp will keep only a short time, even after prolonged heating, unless it is stored in well-sealed packages of some sort. It is at this point that some manufacturers have failed because, although the raw materials may have been fairly free from decayed or putrid material, they have handled it in such a way as to allow decomposition to occur at some of the various stages of manufacture. As a general rule it seems that the decay for which molds are largely responsible appears in the fruit before the actual manufacturing processes are begun, that is on the vines, or in the crates after picking, while those forms in which yeasts and bacteria play the principal role appear in greatest numbers at some stage after the manufacture has begun. Therefore, it is seen that a product may be subject to criticism when the trouble is almost wholly due to molds present on the raw fruit. This is particularly true of much of the product made up at once during the packing season from trimming materials which have not been stored for a sufficient length of time for other forms of decomposition to occur. In some other cases the spoilage is due principally to yeasts, and again bacteria may be the chief source of trouble. Then again any two or all three forms of organisms may be present.

Some manufacturers have supposed that the boiling incident to manufacturing ketchup removed these organisms and the products of decomposition from the material. But this is far from true; for although they may be killed so that further spoilage due to them will not occur, the forms are still readily seen by the aid of the compound microscope, and by chemical methods it has been shown that some of the most important products of the decay remain and the food value of the product is irreparably injured.

METHODS OF MICRO-ANALYSIS AND INTERPRETATION OF RESULTS.

The methods used for determining the character of a pulp or ketchup are given, since inquiries are repeatedly received for this information. Unfortunately, they are of such a character that the manufacturer without scientific training cannot use them to any great extent, though with practice a layman might be able to judge roughly in some particulars as to the character of the product.

Apparatus Required.

The outfit used is as follows:

A good compound microscope giving magnifications of approximately 90, 180, and 500 diameters. This is accomplished by the use of a 16 mm. (two-thirds of an inch) objective and an 8 mm. (one-third of an inch) objective, together with a medium (X 6 compensating) and also a high power ocular (X 18 compensating). A Thomas-Zeiss blood-counting cell,* a 50 cc. graduated cylinder, and ordinary slides and cover glasses complete the apparatus required. It is impractical to use objectives of a higher power than those mentioned, because of their short working distance, which makes their use with the counting cell impossible.

Estimation of Molds.

A drop of the product to be examined is placed on a microscope slide and a cover glass is placed over it and pressed down till a film of the product about 0.1 mm. thick is obtained. After some experience this can be done fairly well. A film much thicker than this is too dense to be examined successfully, while a much thinner film necessitates pressing the liquids out, which gives a very uneven appearing preparation. When a satisfactory mount has been obtained, it is placed under the microscope and examined. The power used is about 90 diameters, and such that the area of substance actually examined in each field of view is approximately 1.5 sq. mm.

A field is examined for the presence or absence of mold filaments, the result noted, and the slide moved so as to bring an entirely new field into view. This is repeated till approximately 50 fields have been examined, and the percentage of fields showing molds present are then calculated. Our experience has demonstrated that for home-made ketchup this is practically zero, and with some manufactured ketchup it is as low as from 2 to 5 per cent., while for carelessly made products it may be 100 per cent.; that is, every field would show the presence of mold. Investigations under factory conditions clearly indicate that with only reasonable care the proportion of fields having molds can be kept below 25 per cent. A specimen in which 60 per cent. of the fields have molds is in more than twice as bad a condition as one containing 30 per cent.

After the percentage reaches 30 to 40 per cent. it will be found that some of the fields frequently have more than one filament or clump of mold, and the number of such fragments might be counted, but in this laboratory this usually is not done. A Thomas-Zeiss counting cell with a center disk of 0.75 inch instead of 0.25 inch, as usually furnished, would give a regular depth of liquid and would be more exact than the method described, but this must be specially manufactured, not being listed in any of the catalogues of microscopic

*This is a cell named after the designer of the form of rulings used, and consists of a slide with a disk ruled in one-twentieth mm. squares, so arranged that when the cover is in place the film of liquid under examination is one-tenth mm. deep. They were originally intended for counting corpuscles in the blood, and are obtainable from practically all manufacturers of microscopic accessories.

supplies, and the method as given is sufficiently accurate for the purpose. When the number of fragments of mold per cubic centimeter is estimated, it has been found to range from virtually zero to over 20,000. There is no excuse for a manufacturer allowing such conditions to prevail that his ketchup shows more than 2,000 per cubic centimeter, while some manufacturers by careful handling hold it down to 150.

Estimation of Yeasts and Spores.

Though the spores referred to are those coming from molds and correspond to seeds in more highly developed plants, it is frequently very difficult to differentiate some of them with certainty from some yeasts without making cultures, which is obviously impossible in a product that has been sterilized by heat. For this reason the yeasts and spores have been reported together, and if there seemed to be a larger percentage of the latter, mention was made of that fact.

To make a count 10 cc. of the product is thoroughly mixed with 20 cc. of water, and after being allowed to rest for a moment to permit the very coarsest particles to settle out, a small drop is placed on the central disk of the Thomas-Zeiss counting cell and then covered with a glass. Care must be exercised to have the slide perfectly clean, so that, when the cover glass is put in place, a series of Newton's rings* results from the perfect contact of the glass surface; and, furthermore, the drop should be of such size as not to overrun the moat around the central disk and creep in underneath the cover glass, thus interfering with the contact.

With the magnification of 180, it has been the practice in this laboratory to count the number of yeasts and spores on one-half of the ruled squares on the disk. With the dilution used this calculates back to a volume equal to one-sixtieth of a cubic millimeter in the original sample, and reports are made on that basis rather than on the number in a cubic centimeter, because the former number is more readily grasped by the mind and affords a simpler notation. To obtain the numbers per cubic centimenter the count made is simply multiplied by 60,000.

It has been found in practice that the number of yeasts and spores varies, for one-sixtieth of a cubic millimeter, from practically none in home-made and first-class commercial ketchups up to 100 or 200, and in one sample the number was as high as 1,200. Laboratory experiments show that, when the number of yeasts in raw pulp reaches from 30 to 35 in one-sixtieth of a cubic millimeter, the spoilage may frequently be detectable by an expert by odor or taste, and from experiments made under proper factory conditions it seems perfectly feasible to keep the number in Commercial ketchups below 25.

Estimation of Bacteria.

The bacteria are estimated from the same mounted sample as that used for the yeasts and spores. A power of about 500, obtained by using a high-power ocular, is employed in this case, and because of the greater number present a smaller area is counted over. Usually the number in several areas, each consisting of five of the small-sized squares, is counted, and the number of organisms per cubic centimeter is calculated by multiplying the average number in these areas by 2,400,000. Thus far it has proved impracticable to count the micrococci present, as they are likely to be confused with other bodies frequently present in such products, such as particles of clay, etc. A comparison of this method with the ordinary cultural methods on samples in which the organisms had not been killed has almost invariably shown that the one used gives too low instead of too high results. In some cases it was found to give not more than one-third of the entire number present. The estimates of the laboratory on this point may, therefore, be considered very conservative.

*These are rainbow-colored rings produced at the point of contact when polished plates of glass are pressed against each other.

As regards the limits which may be expected in the examination of ketchups for bacteria, it might be stated that some manufactured samples as well as good, clean products made by household methods have been examined, and the count found to be so low when estimated by this method that the numbers were reported as negligible. In other words, it was found that for the areas counted over the number of bacteria averaged less than one—that is, less than 2,400,000 per cubic centimeter. It is unusual, however, for the final number per cubic centimeter to be less than from 2,000,000 to 10,000.000 organisms. Contrasted with this number as a minimum it has been found that the number has occasionally exceeded 300,000,000 per cubic centimeter. Such a number as this would indicate extremely bad conditions and carelessness in handling, as the studies of factory conditions have shown that there is little excuse for the number ever exceeding 25,000,000 per cubic centimeter. While experiments have also shown that although the effect produced by the bacteria on the product varies with different species, it is true that their presence can frequently be detected in the raw pulp by odor or taste when the number exceeds 25,000,000 per cubic centimeter and sometimes when the count is as low as 10,000,000.

To one who has not been initiated into the mysteries of the microscope the presence of such a number of bacteria in a food product seems inexcusable. It must be remembered in this connection that the most of these are probably nonpathogenic forms, and many occur naturally on the skins of the fruits. It does not seem just to set a standard so high as to virtually prohibit the manufacture of the product under commercial conditions; rather the idea is to set a limit that the manufacturer can attain if due care is exercised and which will insure a cleanly product. It is, however, perfectly possible to make a cleanly, wholesome product commercially even though the number of bacteria exceed that in the home-made article.

The allowable limits for the bacterial content of tomato pulp vary according to the concentration. The number, however, should be low enough so that when the amount of concentrating necessary for its conversion into ketchup has been accomplished the final product will still be within permissible limits (25,000,000 per cubic centimeter). Thus for a pulp which must be concentrated one-half the bacterial counts should not exceed about half the limits stated above for the ketchup itself—i. e., it should not be more than 12,500,000 per cubic centimeter. The same general rule should also apply to the content of molds and of yeasts.

To insure a sound product, free from decay or any filthy material, many factors must be carefully watched, for not infrequently oversight in one particular has been found to have undone the good effects of the care exercised in all other ways. Thus it is possible for the washing of the fruit to be ideal and the sorting out or removing of the decayed portions beyond criticism, and yet a delay in making up the pulp into the final product may allow an amount of decomposition to occur which offsets the care previously exercised. It has been a matter of surprise to some manufacturers to find with what rapidity some of these organisms increase. In one factory where this point was tested, the bacterial content in a batch of tomato trimming juice was found to be about 7,000,000 per cubic centimeter when taken from the peeling tables, and after standing at room temperature for five hours it had increased to 84,000.000. This was a twelvefold increase in a length of time which was less than half the working day for some of the factories visited. At the end of five days the number had increased to nearly 3,000,000,000 per cubic centimeter. Thus it is seen that the delay in manufacture is very liable to result disastrously.

Such facts as these serve to emphasize the great importance of absolute cleanliness in every detail about factories of this kind. Dirty floors and ceilings and apparatus left with residues of tomato product clinging to them are most fruitful sources for the contamination of new batches of the product. To clean such an establishment properly it is almost imperative

that machinery and woodwork be washed by means of live steam used lavishly at frequent intervals. To leave buckets, tables, conveyors, or any other part of the equipment or floors overnight without cleansing them, as was the practice in some factories, is responsible and tends to contaminate the product and lead to spoilage and loss.

GENERAL CONDITION OF THE FRUIT.

Certain points concerning the general character of the fruit received and accepted at different factories have an intimate bearing on this investigation.

In some places the fruit is demanded in such a dead ripe condition, because of the brighter color imparted to the final product, that there is usually a large amount broken and crushed during transportation and more liability of the development of decay-producing organisms. Such fruit requires more labor in sorting and a larger proportion of waste must result. Because of the extra labor involved in properly removing the decayed portions it is frequently only partially accomplished, and the final effect on the quality of the product is to sacrifice cleanliness to color. There is, of course, no objection to the color itself, but only to the danger attending the use of such ripe fruit that a larger amount is in a more or less advanced state of decay and its removal is only partially accomplished.

METHODS OF HANDLING.

For convenience of discussion the influence of different methods of handling is discussed under the following heads, though the order in which they are actually conducted in various factories varies quite widely; (*a*) sorting, (*b*) washing, (*c*) pulping, (*d*) concentrating, (*e*) storing.

Sorting.

From a study of various methods followed in different factories it seems that at present there is no purely mechanical method of sorting that is satisfactory for performing this work. Especially is this true of the removal of the so-called "dry rot" or "black rot." Some manufacturers have very erroneously supposed that because of the rather hard texture of the dry rot none of it went into the pulp while passing through the cyclone. This is entirely contrary to the facts in the case, as the action of the machine removes most of the dry rot from the fruit and passes it out with the rest of the pulp in which it is easily detected and injures the appearance and character of the final product. In one washer examined the soft rot was satisfactorily removed mechanically, and this apparatus, which was a "home device," will be described under "Washing."

In some factories where the tomatoes are peeled and either canned or made into some whole-tomato product such as chili sauce, the trimmings are used in the manufacture of pulp or ketchup. Some manufacturers make no attempt to reject the decayed portions of the fruit and hence their products are almost sure to show up badly under the microscope. On the other hand, some firms depend on the peelers to sort out and reject the decayed portions, but after watching this as practiced in different places, the writer is convinced that the elimination of objectionable parts cannot be effectively accomplished in regular factory practice by this method, for, being paid by the piece for the peeled tomatoes only, the peelers become carless or indifferent about the removal of the decayed portions from the trimmings which are to be used for pulp making. In one place where this method was followed, an examination of portions of the trimmings collected during the day showed from 15 to 20 per cent of the fragments to be decayed to a considerable degree. In some factories the sorting is done before the washing or scalding, others make it an intermediate operation between the principal washing and scalding with a final rinsing. Then the peelers are furnished with buckets in which to place any decayed parts that they may find which escaped the principal sorting. In favor of the intermediate method

there is this to be said, that the fruit being more or less washed, the decayed portions are more readily seen and picked out.

Some manufacturers have asked what would be the influence of using tomatoes which are partially decayed, provided the decayed portions were cut out. It has been shown by experiments made under factory conditions that if the decayed portions are carefully cut out and discarded the remaining peeled portions of tomatoes may be almost as free from objectionable material as a product made from wholly sound tomatoes. An experiment illustrating this fact was made in one factory with the results given in the table. The fruit was carefully sorted into three grades before washing. Grade No. 1 contained mostly sound tomatoes, but due to the overripe condition of the fruit more decayed spots went in than would usually be the case. Grade No. 2 represents those tomatoes which were partially decayed, and No. 3 those which were so badly decayed as to be wholly worthless and which were entirely discarded. The chili sauce from these gave the following results:

Chili sauce from sound and from partially decayed tomatoes, using only the sound portions.

Kind of organisms.	Grade No. 1. Sound tomatoes.	Grade No. 2, made from tomatoes from which the decay was removed.
Yeast and spores per one-sixtieth cu. mm.	4	6
Bacterial per cubic centimeter.....	2,000,000	9,000,000
Molds	(1)	(2)

1 Less than 2 per cent. 2 Less than 2.5 per cent.

While the number of bacteria in the second-grade product appears to be much higher than in the first grade, this difference is almost negligible when considered in connection with the allowable limit of 25,000,000. Pulp made from trimmings of grade No. 1, which had been allowed to stand on an average about one and one-half hours, gave:

Yeasts and spores per one-sixtieth cu. mm.....13

Bacteria per cc.....9,000,000

Molds in 17 per cent of fields.

From the first grade there were obtained four barrels of peeled tomatoes and two barrels of trimmings; from the second grade one barrel of peeled tomatoes and two barrels of trimmings. From this it is seen that the condition of the fruit was such as to make the loss due to decay very heavy.

At some factories they sort by pouring the fruit from the crates upon tables placed conveniently to the washing apparatus, and the fruit is looked over and decayed pieces removed before it is dumped into the washer. In other places the fruit from the washer is dropped upon some form of conveyor, which carries it alongside of the persons doing the sorting, who are supposed to examine and remove all undesirable fruit. At another place the sorting was done by picking the fruit by hand out of the crates and making the examination. Of these three methods the last may be somewhat the best, but is expensive, because of the time required in the handling of the product. After working beside the sorters, noting each method, and observing carefully the results obtained, it appeared to the writer that a large part of the defective sorting was due to the fact that in order to make sure that every fruit is sound it must be turned over in some way so that all sides of it may be inspected, and thus far no mechanical device for doing this has been seen. If this could be accomplished, it would result in a great saving of time in those factories where the sorting is at present being well done, and in a more effective sorting in those places where at present too few persons

are assigned to this inspection to make it satisfactorily when so great a quantity of tomatoes must be examined in a short time. It seems that it would not be a serious mechanical problem to devise an apparatus which would turn the tomatoes as they pass in front of the sorters, and thus increase the effectiveness of this part of the work.

Washing.

The process of washing is a very important one, since by it the sand and soil are removed, and if this is not properly done, the product is liable to be condemned as filthy.

If the skin of the fruit does not enter into the food product, this feature is not of such moment, since the sand would be removed with the skins and discarded; but if the whole tomatoes or trimmings are used in the manufacture of a finished product it is very important that the washing be well done.

This is attempted by a great variety of methods, some of which are effective while others are worthless. Those washers in which the fruit is simply dipped into the water are practically useless. In some of these the water was changed so seldom that even if the soil were removed they would still be open to severe criticism. They may serve as scalders, but in no sense are they more than mere rinsers when it comes to the question of removal of dirt. Any washer which allows fruit to come through with soil still clinging to it is obviously ineffective.

After watching the operation of 10 or 12 different forms of washers and observing the fruit as it came from them, it appears that the most effective one seen was a machine devised, and in part constructed, as a home-made washer remodeled partly from a pea grader. It consists of a cylindrical body 8 feet long and 2 feet in diameter covered with a screen of about 1-inch mesh wire. The cylinder rests on trunnions, so that there is no shaft or arm extending through the inside, and is made to revolve by a cogwheel gearing. The cylinder is so placed as to have a fall of about 1 foot between the ends. A water pipe furnished with small holes is suspended lengthwise somewhat above the center of the cylinder, so that as the fruit is rolled in the cylinder the water is sprayed over it. The tomatoes are fed in at the upper end and as the cylinder revolves they work along toward the lower end. The cylinder revolves about twenty times a minute and it takes about 30 seconds for the fruit to pass through, three or four crates being washed at the same time. This means that the fruit is rolled and tumbled a distance of about 60 feet, with fresh water sprayed over for the whole distance, as the water when once used passes into the sewer.

One important point in favor of this arrangement is that there is sufficient rubbing of the tomatoes against each other to loosen and scour off the dirt, and when this has been done a comparatively small amount of water is required to wash it off. In some washers, even when a great pressure and a great amount of water were used to produce the spray, it was found that much of the dirt came through still clinging to the fruit. This difficulty seems to be due, not to the amount of water used, but to the fact that there is no effective means provided for rubbing the dirt loose. Another point in favor of the washer described is that the soft rot also is quite effectively removed, being pounded to pieces and carried through the screen with the waste water. The chief objection to this form of washer is that the very ripe fruit demanded by some canners and manufacturers would not survive such rough handling. That, of course, is an important point, but the question arises, is it desirable to use such ripe fruit? And the fact remains that the effective removal of the dirt, if the skins are to go into the manufacturing process, is the most important point under consideration, and this or any other effective means by which the cleansing is actually accomplished would be acceptable.

Pulping.

The machinery used for pulping was practically the same in all factories. In a few plants the tomatoes or trimmings, as the case may be, were run through a chopper before going to the pulper. In some the stock was cooked before running it into the pulper, while in others the pulp was made from raw tomatoes. It makes very little difference which method is used, so long as there is no material delay between the time of pulping and the using of the pulp. At some places the pulp is run as fast as made into a single vat and drawn out from the same during the day as needed. In this way the fresh pulp is run in with some that may have been in the tank for several hours, and the fact that the tank is not completely emptied and cleaned out from morning till night allows spoilage to begin, and some injury to the product is done. A better way is to have a set of smaller vats, if the pulp is to be stored at all, so that each vat as it is emptied can be cleaned out before a new lot is run in, thus checking any fermentation that might result due to the storing of the pulp in the same vat throughout the day's run.

One serious criticism to be made of the gravity method of concentrating as practiced by some factories is the length of time that the product stands before being cooked up into the final product. This was found to vary in different factories from 30 minutes to half a day or more. A few did not leave a batch standing more than 30 minutes after the last of it had been run in, but by that time the first that had gone into the vat had usually been standing from one and one-half to two hours. Even this length of time allows a large number of organisms to develop, and it makes little or no difference in the final product where the decay occurs, whether in trimmings from the tables, in the vats after chopping (if that is practiced), or in the pulp in the vats before it is worked up. As soon as the fruit is peeled it is imperative that the trimmings should be worked up with the least delay possible, for it has been shown that spoilage takes place rapidly after the tomato tissues are torn.

Although this applies especially to the handling of trimmings, it is equally true of the whole tomato pulp. And furthermore, to expect that the results of carelessness in handling the pulp stock can be removed by subsequent cooking is a serious mistake, for though the product will be sterilized by sufficient cooking, the dead organisms that produced the decay remain in the ketchup, as well as some of their products of decomposition, and a marked deterioration in the character of the final product necessarily results.

Concentrating.

The tomato pulp, as it comes from the pulper, contains the fibrous cellular material of the fruit, and also the "water" or more properly, the juice of the tomato. The cellular material is insoluble in water and corresponds to the residue remaining after cider has been squeezed from apple pulp. In the juice or "water" are contained the most of those products which give to the tomato its characteristic taste and flavor. Among these are certain fruit acids and sugars without which the product has a flat taste.

The pulp obtained from the fruit in making ketchup is usually concentrated, by boiling or otherwise, to about 50 or 25 per cent of the original volume. Finely chopped tomatoes or tomato pulp on standing separates into two portions, due to small amounts of gas held in the fibrous portions. The lower stratum contains a considerable proportion of the water from the fruit, together with some of the soluble solids, while the top contains more or less water and the insoluble portions, which consist largely of the cellular material. By careful manipulation it is possible to draw off half or two-thirds of the original volume in the lower layer, and some have supposed that they were removing nothing but the water by this operation, but the facts are quite to the contrary, as the water which is removed is as rich in the natural sugar and acid of the fruit and flavoring material as that remaining in the pulp.

A simple test of this loss can be made by placing some of the "water" in a suitable dish and boiling it down to about one-fourth of the original volume. The resulting product will be found to be especially rich in tomato flavor. Thus it is seen that the gravity method is an extremely wasteful one. Though this method of concentrating is cheaper than by boiling, this is about the only thing that can be said in its defense. Some claim that the product is subjected to heat for a shorter time by this treatment, and therefore it retains a better color; but with a proper arrangement of kettles having a good head of steam (80 pounds or more) the concentrating of the entire pulp to the consistency of ketchup can be accomplished in from 40 to 50 minutes, which is as short a time as is safe if even an approximately sterile product is to be obtained.

It was found that 9 per cent of the factories that were making ketchup from whole tomatoes were using the gravity method of concentrating. Of those that were making trimming pulp, 78 per cent used this method. Frequently manufacturers who make both whole tomato ketchup and also a trimming pulp grade use the entire juice method for the whole pulp and the gravity method on the trimming pulp.

At some plants it is customary to process the ketchup after bottling, while others find it unnecessary. The formula and amount of concentration are probably largely responsible for this difference, as well as for the varying temperatures at which the product is bottled.

Storing.

While some factories do not make up all of the pulp during the packing season many are doing this both because of the superior product obtained and because of the difficulty of keeping the stored pulp in good condition. Many of the canning factories simply make the pulp and sell it to the final manufacturer. The proper storing of the pulp is an important problem, since if it is not properly handled, spoilage will set in, offsetting any previous care which had been take to produce a good product. The pulp is usually stored in barrels, or in 5 or 6 gallon tin cans; stone jugs and jars or 1-gallon tin cans are also used, but to a much less extent. Manufacturers state that the use of the larger size tin cans is rapidly gaining in favor, while the barrel method is being discarded by the more progressive plants. The cost of these cans ranges at present from 24 to 70 cents each, and with care they can be used for from two or four years. From this it is seen that storing in cans is more expensive than in barrels, but a comparison of pulps put up by the two methods after a few months of storage is sufficient to demonstrate the superiority of the can method. The examinations made indicate that pulp stored in barrels always shows spoilage to a greater or less degree and possesses more or less of the following characteristics: Gas, sourness, excessive numbers of bacteria and yeasts, certain products of decomposition, and usually a change in color, flavor and odor. However, in the use of the cheaper and consequently more lightly coated tin cans there is danger of exceeding the content of tin salts allowed in food products by Food Inspection Decision 126 (300 mg per kilo). The heavier coated and lacquered tins are, therefore, greatly to be preferred for this purpose, as the tomato pulp is a product which, due to its acidity, has considerable action on the ordinary tin can.

In canning the pulp some plants make a practice of processing the cans after the product has been sealed. On the other hand, others say this is unnecessary if the product has been sufficiently concentrated by boiling and the cans filled while the pulp was boiling hot, direct from the kettles. When this is possible the labor and expense of processing is saved. In some factories the arrangement is such that the product from the kettles must pass quite a distance through pipes into the storage vat from which the cans are filled. This allows considerable cooling and contamination and will cause spoilage unless the cans are processed after sealing.

FLAVORING EXTRACTS

Bitter Almond.—Two drams oil of bitter almond, 1 gallon 95 per cent. alcohol; mix and filter through paper.

Honey Extract.—One ounce extract vanilla, ½ dram oil of rose (Kissanlik), ½ dram oil of wintergreen, ¼ ounce oil of peppermint, 1 pint 95 per cent. alcohol. Mix and filter through paper.

Soluble Lemon Extract.—One-half pound oil of lemon, ½ gallon 95 per cent. alcohol, ½ gallon water, 8 ozs. purified talcum.

In a large mortar place the purified talcum, add the oil of lemon gradually, and rub constantly until intimately mixed; then add the alcohol gradually, rubbing all the time, and after that the water; pass through a double paper filter. If the first liquid that passes is not clear, pour it back into the filter again.

Soluble Orange Extract.—Make same as lemon, using ½ pound oil of orange.

Vanilla Extract.—Cut ½ pound of good vanilla beans in short pieces, place in a mortar with some fragments of broken glass, and pound until fine; place in a stone jug or glass bottle, and add 1 ounce of Corrigliano licorice in small pieces, 1 pint of pure glycerine, ½ gallon 95 per cent. alcohol and 3 pints of water; soak three weeks, shaking occasionally; then filter off for use.

SPICE MIXTURES.

Curry Powder.—Three pounds powdered tumeric, 3 pounds powdered coriander seed, 1 pound powdered white pepper; ¼ pound powdered cayenne pepper, 1 pound powdered Jamaica ginger, 1 pound powdered yellow mustard, ½ pound powdered allspice; ½ pound powdered cardamon seed, ¼ pound powdered cumin seed, ¼ pound powdered cloves. Mix well together.

Catsup Spices (Powdered).—Four pounds white pepper, ½ pound cayenne pepper, ¼ pound nutmegs, ¼ pound cloves, ¼ pound Saigon cinnamon, ½ pound coriander seed, ½ pound thyme, ¼ pound marjoram, ¼ pound bay leaves. Mix.

Catsup Spice (Powdered).—Two pounds white pepper, 2 pounds allspice, ½ pound cloves, 1 pound yellow mustard, ½ pound peach leaves, ½ pound cayenne pepper.

Catsup Spice (Powdered).—Three pounds white pepper, ½ pound cayenne pepper, ½ pound allspice, ½ pound cloves, 1 pound celery seed. Mix.

Soup Spices (Powdered).—Half pound lemon peel, 1 pound thyme, ½ pound sweet marjoram, ½ pound summer savory, 1 pound parsley, ¼ pound celery seed, ¼ pound sweet basil. Mix.

PICKLING

All tanks, casks or barrels used in salting vegetables for pickles or soups should be provided with a loose cover of boards or plank, fitting inside the container, a few inches below the top, and with cleats or other suitable means, that the vegetables can be kept under the surface of the brine. When the tank is full, cover the vegetables with cheese-cloth or other suitable material. Place the cover in position and fasten down. Skin off all froth and foam, and keep the top covered with 60-degree brine. When fermentation has ceased, remove cover, take off cloth and wash both free from all slime and dirt; replace and cover with brine. From time to time add sufficient 60-degree brine to keep cover submerged. Large tanks used for dry salting must be provided with a pump-box or shield on one side, so that he brine may be pumped from the bottom to the top of the tank when it is heavier at the bottom than at the top.

Unless otherwise mentioned, brine is to be 60-degree by salometer.

Beans, String and Lima.—Blanch the beans in boiling water, pack in tanks, sprinkle with a quarter of a bushel salt to each 16 bushels; fasten down top and cover with 60-degree brine.

Cauliflower.—Trim and break the cauliflower apart, blanch one minute in a bath containing one ounce of sulphite of soda to 12½ gallons water; pack in tank and sprinkle each 16 bushels with ½ bushel salt. When tank is full, place lid, and cover with 60-degree brine.

Citron, Domestic.—Pare the citron and remove all soft pulp and seed; cut the flesh in small pieces and pack in tanks; sprinkle each 16 bushels with ½ bushel salt; fasten down cover and cover with 60-degree brine.

Corn.—Cut from cob in whole grains, silk and pack in tank, with ¼ pound salt to each 16 bushels; place cover and fill with 16-degree brine.

Cucumbers.—Pack in tank as tightly as possible with ½ bushel salt to each 4 bushels, using just enough water to moisten the salt: if they do not make brine enough to cover themselves in a few days, fill up with 60-degree brine.

Onions.—Pull onions when of the desired size, selecting only those which have been entirely covered with earth. Store in slatted crates or ventilated barrels in a cool, airy place, until the tops are thoroughly dried; then rub and sieve to remove all adhering soil.

Pack in tank, using 18 pounds salt to 100 pounds onions. Let stand for a few days; refill with onions, place lid and cover with 60-degree brine.

Pumpkin.—Same as citron.

Peppers, Bull-nose, Ripe or Green.—Cut out stem, remove core and seed, pack in tank nose down; sprinkle with ¼ bushel salt to each 16 bushels; place cover and fill with 60-degree brine.

Sauerkraut.—Cut off the outside green leaves of the cabbage, core and cut; for each 100 pounds of cut cabbage mix 2½ pounds salt, pack tightly in barrels or tanks to ferment. If wanted for quick shipment, pack in barrels, and stand in a warm place to ferment. After fermentation, refill barrels, head and ship.

Cucumbers.—Place salted cucumbers in a process tank containing a perforated steam coil covered with an inverted trough so that the pickles cannot come in direct contact with the steam. Cover well with cold water and heat to 100 degrees; soak 12 hours, then drain off the liquid, again cover with cold water, and heat to 120 degrees, soak 12 hours, and drain off liquid, cover the third time with water. Heat to 135 degrees, soak 12 hours and the pickles are ready for vinegar.

Sort the pickles according to size, and place in packages with a sprinkling of whole mixed spices, 2 parts yellow mustard seed, one part each of allspice, cloves and bruised ginger root and West India or bird peppers; also a little horse radish root on top, then fill with 42½ degree grain vinegar.

Dill Pickles.—Have well-coopered barrels; take out head, and in bottom place a handful of dill with a clever sprinkling of mixed spices, pack half full of cucumbers and another handful of dill with spices; fill barrel with cucumbers, finishing the top with dill and spices. Head up barrel and fill through bunghole with 50-degree brine, to each 45 gallons of which has been added 2 gallons 45-grain vinegar. Bung up barrel; bore a hole through the bung in which place a nipple connected with a half-inch rubber tube, the end of this dropping in a bottle fill with water. If in a hurry use 30-degree instead of 60 degree brine.

Mixed Pickles.—Process small cucumbers, corn, cauliflower, beans, etc., same as cucumbers; place in bottles with mixed spices and onions and fill with 42½ grain vinegar.

Pickled Onions.—Remove from brine and peel; place in process tank, cover with cold water and heat to 90 degrees; in a few days a secondary fermentation will take place; once or twice a day press down the floaters and allow to remain until the onions have bleached to the desired shade of whitenesss; then wash well in cold water and place in packages, adding a sprinkling of spices, whole mustard seed (yellow) 2 pounds, whole mace, 1 pound, and West India peppers, 1 pound, and cover with prepared vinegar (50 gallons 45 grain vinegar, 4 ounces preservative, ½ pound alum).

Sweet Pickles.—Prepare and pack pickles, salt same as for "mixed pickles," and cover with sweet liquor instead of vinegar. For this, place in 50 gallons 45 grain vinegar, 10 pounds black mustard seed, 5 pounds West India peppers, 5 pounds Jamaica ginger root, 4 pounds whole black peppers, 4 pounds whole allspice, 1½ pounds whole cloves, 1 pound whole mace, 5 pounds horseradish, 2 pounds celery seed, 5 pounds chopped garlic. Soak twelve hours, place in kettle, bring to a boil, then strain and dissolve therein 30 to 50 pounds sugar, according to sweetness desired.

The more sugar used the greater the cost and more crisp the resulting pickle.

FISH

Aside from salmon and sardines, comparatively little attention has been paid to fish canning, though the demand, particularly for the salt water varieties, is increasing. After being caught, the quicker the treatment of the fish begins at the factory, the better the quality of the product obtained. Putrefaction sets in quicker than in meat, and the stock must be promptly handled. If fish are iced or kept in cold storage they require treatment the moment after removal.

SALT WATER FISH.

To Can Salt Water Fish of a suitable size for No. 2 cans, such as sea trout (weak fish), sea bass, herring, etc., scale, cut the gills and pull out the interior or cut off the head just forward of the shoulder, slit down the belly to vent and remove entrails; cut off all fins and cut fish to can lengths; wash off in clean water. Cover the fish with a generous quantity of 60 degrees (salometer) brine and soak one or two hours according to thickness of fish; they must remain until all the blood is extracted. (Never use brine the second time). A No. 2 can will hold 3 or 4 fish of the proper size; if 3, place the first two in shoulder first and the last one tail first; if 4, place the first two in shoulder first and the last tail first. Fill the cans with brine (3 lbs. salt, 12½ gallons water), cap, exhaust 10 minutes at 212 degrees, tip and process 45 minutes at 240 degrees, then raise to 250 degrees for 10 minutes, remove from retort and place in cooling bath.

For Blue Fish, Cod and other large salt water fish use flat cans; clean and cut in pieces of suitable size, soak in brine until blood is extracted, pack in cans, solder on lid, exhaust and process same as above. If fish are very large, split down back and remove backbone.

CORNED FISH.

Scale the fish, cut off heads, split down back, clean and wipe dry (do not wash). For 100 pounds fish intimately mix 5 pounds salt, 5 pounds brown sugar, 5 ounces powdered saltpeter and rub fish, inside and out, with the mixture. Pile the fish skin side down in tanks and weight. Allow them to remain 48 to 60 hours, according to thickness of fish. Then wash and drain, cut to can size, place in can, fill with sauce (water, 12½ gallons; 60-grain vinegar, 1 gallon; whole cloves, ½ pound; bay leaves, ½ ounce; chopped onions, 2 pounds; salt, 3 pounds; whole black pepper, ½ pound). Soak pepper, cloves and bay leaves 48 hours or more in the vinegar. Place

the water, salt and onions in kettle, bring to a boil and cook 30 minutes, then add the vinegar and spices, let boil one minute and strain. Cap, tip and process at 240 degrees, 1 lb. cans, 30 minutes, 2 lb. cans, 45 minutes.

Small fish may have the heads left on and be packed dry in oblong flat cans, exhaust 10 minutes at 212 degrees and allow 10 minutes more process time.

Either large or small fish may be drained and lightly smoked, packed dry, exhaust 10 minutes and allow same process as for corned.

SMALL FISH, SARDINES, ETC., IN OIL.

Clean and cut to can size, soak in brine as before directed, remove and dry in a blast of dry, warm air; spread on wire trays and dip in sweet oil, heated to a temperature of about 300 F. (Oil boils at about 360 degrees; this is too hot and will soften the fish). As soon as fish are cool enough to handle, pack tightly in can, fill with hot oil, seal, tip and process at 240 degrees, 1 lb. cans, 25 minutes; 2 lb. cans 35 minutes.

SMALL FISH IN BOUILLON.

Prepare the fish, reserving the heads and trimmings, same as directed for small fish in oil, or broil them over a naked fire or under gas; pack in cans, fill with bouillon and process same as fish in oil.

For the bouillon place 10 gallons of the washed heads and trimmings in a suitable kettle, add 12 gals. cold water, 2 lbs. chopped onions, ½ lb. whole Juniper berries, ¼ lb. grd. white pepper, 2 ozs. grd. red pepper; bring to a boil, then simmer gently one to two hours; strain off the liquid and add 3 per cent. of salt.

A splendid sauce is made of the "melts" as follows: Ground melts (5 lbs.); water, 5 pts.; grd. onion, 5 oz.; juniper berries, 2 oz.; pepper and salt sufficient.

SALMON.

Salmon are caught by various methods and devices, including traps, seines, gill-nets, purse-seines and hook and line, for commercial purposes, in the waters of the Pacific Ocean and coast streams, from a point in California to Kotzebue Sound, which is within the Arctic Circle.

The method of canning salmon, under the sanitary process, is as follows:

The salmon are taken from the lighters or scows to the fish wharves principally by means of elevators and are carried into the fish houses, where they are placed on tables and the heads are cut off.

From there, they are carried on an elevator to a machine known as the iron chink. This machine slits the fish and removes the entrails, also cuts off the fins and tail. After the fish go through this

machine, they are carried along an elevator to a water tank, where they are scrubbed and cleaned. They are then placed on an elevator which is a part of the gang knife machine, where the salmon are cut across the body into pieces four and a quarter inches in length. They are then taken into the filling machine, where the cans are filled with one pound of salmon to each can.

Thence they are carried to a machine where they receive a top, and then to the exhaust boxes, where they receive an exhaust in live steam about seven to twelve minutes. From the exhaust boxes, they are taken by a chain carrier to a closing machine, where the tops are securely fastened by means of rolls. The cans are then carried to the retorts, being ready for cooking.

After being placed in the retorts, and the same closed securely, steam is turned into the retort. When the temperature reaches a height of 220, the clock is set at this time. The cooking is then carried on for one hour and thirty-five minutes, under a temperature of 240 degrees Fahrenheit, with a pressure of eleven pounds. At the end of the cooking period, steam is turned off immediately, the relief valve is opened, and when pressure has been relieved, the retort opened the cans are taken therefrom to the test kettles, where each can is dipped for the test of any leaks.

They are then placed on the floor of outbuildings for cooling purposes, and when cooled are piled ready for lacquering and labeling, which are done under the usual process, both being done by the machine.

There are about 48 one-pound cans to the case and weigh about 68 pounds gross.

Some canners cook only one hour and twenty minutes, but the usual time deemed necessary to thoroughly sterilize the bone is one hour and thirty-five minutes.

CRAB MEAT.

Do not steam the crabs but cook in water in which for each 25 gals. has been dissolved 1 lb. bicarbonate soda (common baking soda), bring to a jumping boil, dump in the live crabs, bring to a boil and cook 20 minutes. Pay no attention to the foam, let it run over and go to waste. Draw off the liquid left after the cooking, then wash the crabs with cold water. Pick the meat, being careful to keep out all leg and claw joint shells; wash the picked meat in cold 1 per cent. brine (1 lb. salt to 12½ gals. water), drain off all liquid and pack in enameled cans or plain cans lined with parchment paper, cap, leaving tip hole open, exhaust No. 1 cans 8 minutes, No. 2 cans 10 minutes, close tip hole and process:

No. 1 cans 20 minutes at 240 degrees, then 10 minutes at 250 degrees.

No. 2 cans 35 minutes at 240 degrees, then 15 minutes at 250 degrees.

After process time has expired, blow off retort and, without opening retort, turn in a stream of cold water through a properly introduced pipe at the top of retort, thus cooling the cans without direct exposure to the air. If cans are taken out of retort before cooling, the meat will darken to a greater or less extent in a short time.

DEVILED CRAB MEAT.

1 lb. Butter, or Butterine.
1 lb. Flour.
1 gal. Fresh Milk.
2 ozs. Chopped Parsley.
2 ozs. Onions, minced finely.
4 ozs. Salt.
½ oz. Ground White Pepper.
½ oz. Ground Red Pepper.

Place the butter in a suitable kettle and melt, add the flour and mix intimately, add the milk and while stirring constantly bring to a thorough boil, then add the salt and other ingredients; now add enough crab meat to make a mass of the proper consistency to fill in shells. Pack in cans while hot and process same time as crab meat.

SOFT SHELL CRABS.

First Method—Clean and prepare the live crabs, place in wire baskets of suitable size and cook same as hard crabs; place in cans, fill with hot 3 per cent. brine, cap, tip and process:

Half No. 1 Cans 15 minutes at 240 degrees, then 8 minutes at 250 degrees.

No. 1 Cans 20 minutes at 240 degrees, then 10 minutes at 250 degrees.

No. 2 Cans 35 minutes at 240 degrees, then 15 minutes at 250 degrees.

Second Method—Clean and prepare the crabs, place in wire baskets and plunge in boiling oil or lard for 5 minutes; provide the kettle with an extension top so that the oil will not overflow; pack the crabs in cans, fill in enough of the hot fat or oil to make a "bed," cap, tip and process same time as above.

FRESH WATER FISH.

Large or small may be treated, handled and processed same as salt water fish, except that the brine used must contain ½ to 1 per cent. of alum, or some other hardening agent. Any suitable sauce, tomato, mustard, etc., may be used in place of brine for filling cans.

HERRING ROE.

Clean off adhering shreds and strings, wash in cold water, then soak two hours in 3 per cent. brine, drain and pack in No. 2 cans,

cap and exhaust 10 minutes, tip and process 60 minutes at 240 degrees.

CLAMS (SOFT).

Handle same as oysters, exhaust 10 minutes at 212 degrees, process at 240 degrees 1 lb. cans 15 minutes, 2 lb. cans 20 minutes.

QUAHAUGS (HARD CLAMS).

Handle same as oysters, exhaust 10 minutes at 212 degrees, and process at 240 degrees, 1 lb. cans 20 minutes, 2 lb. cans 25 minutes, 3 lb. cans 30 minutes.

LOBSTERS.

Any of the following methods or a combination of them may be used in canning lobsters.

First Method of Cooking—Plunge the live (only) lobsters in a tank of rapidly boiling water containing 2 to 3 per cent. salt, and cook 30 minutes, then chill in cold water.

Second Method—Plunge in rapidly boiling water containing 3 per cent. solution bicarbonate soda and cook 15 minutes; draw off the solution and cover again with cold water acidulated with enough vinegar to neutralize the soda remaining in the lobster and cook 15 minutes, then chill in cold water.

Third Method—Kill the lobster by cutting it at the joint where the tail and body shell come together; then cook by either first or second method.

CLEANING AND PICKING.

When cool enough to handle twist off claws and tail; split the tail underneath into halves and remove intestinals; open the body shell and take out liver and coral; take body from shell and remove stomach; crack claws and pick meat from these and shell, keeping all pieces large as possible. Mix a small proportion of salt (to taste) with the prepared meat, pack in No. 1 cans solidly, dividing the claw meat and larger pieces equally.

CANS.

If plain tin is used, line top, bottom and sides with parchment paper to prevent the meat coming in direct contact with the tin; especially if the first method of cooking is employed.

By the second method of cooking the meat will not develop so much of the "tinny" flavor as will that cooked in plain salted water.

Cap the cans and exhaust in steam until contents of cans show a temperature of 150 to 160 degrees. Tip and process 1 hour at 250 degrees. Cool cans in cold water. Handle the hot cans gently as possible to avoid "matting" contents.

OYSTERS.

In the factory plan before submitted it is intended that the steam box be placed outside of the building and be retained permanently in place with the idea in mind of utilizing it not only for

oysters, but also for beets and sweet potatoes during their season. If the wharf where the oysters are received is of sufficient size it may be roughly enclosed to contain the steam box and room for the shuckers; or the steam box may be placed in the open and after steaming run the cars into the peeling room where the tracks, arranged with suitable switches or turntable, will occupy the portion of the room not occupied in pineapple and pea packing. The tracks may be so constructed as to have a gentle incline from the loading to the shucking point in order that the loaded cars may be more easily moved, but, unless the space is not otherwise used so that the tracks can remain permanently in place, it is preferable to have the tracks uniformly level.

When oysters are received in a muddy condition it is best, though not necessary to wash before steaming. When oysters are kept for any great length of time, either in cars or on the floor, wet them down once or twice a day with cold water; they will require this moistening oftener in warm than cold weather.

When ready to steam run the loaded cars in steam box, close the doors and fasten the clamps opposite the hinges first; turn on steam until gauge marks 10 pounds pressure and maintain at this point 8 to 10 minutes (oysters well covered with mussels will require 3 to 5 minutes more) until the shells open readily; then exhaust steam and open doors by releasing the clamps nearest hinges first and those opposite last.

Require the shuckers to roughly sort the meats into two sizes, primes and selects, after which wash well in cold water and place on packing table where before putting in cans remove all torn, broken and discolored oysters. If for any reason it is necessary to carry shucked steam oysters over night cover them with cold water in which has been dissolved 1 per cent. bicarbonate soda.

Under certain weather conditions it may be advisable to can raw shucked oysters which have been prepared for future shipments. These should be first well washed in cold water, then given a bath in a 1 per cent. solution of bicarbonate soda, then plunged in boiling water until the gills curl, after which handle same as steamed stock.

The cans must be filled as full as practical with the oyster meat, and for this reason the Government has set the following weights as about what the cans will be expected to turn out, after processing:

Cans: Diameter	Height	Weight of drained oysters, "cut out."
2 11-16	2 3-4	3 ozs.
2 11-16	3 6-16	4 ozs.
2 11-16	4 No. 1	5 ozs.
3 3-8	3 15-16	8 ozs.
3 3-8	4 9-16 No. 2	10 ozs.

Weigh out the desired amount of meats, place in can, fill with brine (2½ lbs. salt to 12½ gals. water), cap, exhaust 10 minutes at 212 degrees, tip and process at 240 degrees No. 1 cans 12 to 14 minutes and No. 2 cans 14 to 17 minutes, according to weight of meat.

SHRIMP.

When the shrimp are brought on the dock they are stored in ice until ready to use. The ice makes the peeling easier and is necessary to prevent spoilage. The removal of the head and shell is known as "peeling" the shrimp, and this is done for all canned shrimp. The head and thorax break from the heavy tail with ease and a slight squeeze will separate the fleshy portion from the shell. This work is done rapidly; the pay for peeling is about 1c. per pound. The peeled shrimp are thoroughly washed in two or more changes of water and are then ready for blanching. The blanching consists in boiling the shrimp in salt water, which is done by suspending them in a wire basket in the boiling brine. The time of the blanch is usually about four minutes for the wet and five minutes for the dry pack. The salt in the brine is in the proportion of about 1 pound per gallon of water. Up to the time the shrimp go into the blanch they are white or slightly gray in color; the boiling in the brine causes them to become bright pink or red

The shrimp are turned out upon trays having wire netting. As soon as cool they are filled into cans by hand, each can being weighed. The shrimp are all packed in either No. 1 or No. 1½ cans, the former having 4½ ounces and the latter 9 ounces. There is no attempt at grading.

Shrimp are put up in what are known as dry and wet packs. In the dry pack no liquor is added, while in the wet pack brine is used. The process for dry shrimp is 1 hour at 240 degrees F. or 4 hours at 212 degrees F. for No. 1 cans, and 75 minutes at 240 degrees F. and 4 hours at 212 degrees F. for No. 1½ cans. The process for wet shrimp is 11 minutes for No. 1 and 12 minutes at 240 degrees F. for No. 1½ cans.

GREEN TURTLE.

Hang the turtle up head downward, and with a sharp knife cut off the head close to the skull; allow to hang at least 12 hours, for blood to drain out; separate the shells, being careful not to break gall bladder, which remove with the entrails, separate the green fat and reserve; boil the shells in water long enough to separate the bones, then scrape off the mucilage and reserve; put the head, fins, liver, lights and heart in the liquor in which the shells were cooked and also the meat, enclosed in a cage; cook until meat is done, then divide the meat, green fat and mucilage equally among the desired number of cans, and fill with the strained liquor, in each gallon of which has been dissolved ½ lb. gelatine; cap, tip and process at 250 degrees, No. 1 cans 60 minutes, No. 2 cans 70 minutes.

SNAPPING TURTLE.

Cut off head with a sharp hatchet, hang up by tail for 12 hours to drain out blood; wash and drop in boiling water until shells part easily; pull out toe nails, take off lower shell, and remove gall, which be very careful not to break; remove the liver, heart and eggs, separate the flesh from upper shell and cut in pieces. Place the meat, including skin and legs, the heart, eggs and chopped liver, in kettle with just enough water to cover, and cook until skin is soft and jellylike; then place in cans, dividing the white meat and eggs as evenly as possible; cap, tip and process at 250 degrees, No. 1 cans 55 minutes; No. 2 cans 65 minutes.

STEWED SNAPPING TURTLE.

To 50 lbs. of snapper cooked ready to go in cans, add 50 lbs. of meat jelly, 2 lbs. of salt, 2 oz. of ground white pepper, 1 oz. of ground cayenne pepper, 1 oz. of ground Saigon cinnamon; bring to a boil, shut off steam and add one-half gallon of sherry wine; place in cans, tap, tip and process at 250 degrees, No. 1 cans 55 minutes, No. 2 cans 60 minutes.

STEWED TERRAPIN, DIAMOND BACKS OR RED LEGS.

Twenty-four terrapins, 1½ gals. cream, 6 dozen eggs, 10 lbs. butter, one lb. salt, 1½ oz. powdered mace, 1 oz. cayenne pepper, 12 pints of sherry wine. Plunge the live terrapin in boiling water, and cook until the toe nails and outer skin come off readily, remove these and place terrapin in clear, salted boiling water and until the legs are quite tender, then clean same as snapper, but keep the small intestines, which cut in very small pieces.

Place the cut-up meat, intestines, liver, eggs and liquor given out while cutting up, in kettle, add the butter and heat until melted. then add the cream, seasoning and bring just to a boil; turn off steam and add the yolks of the eggs, previously hard boiled, mashed and creamed with the wine; place in cans, cap, tip and process No. 1 cans 50 minutes at 250 degrees.

The National Pure Food Law

The National Pure Food Law passed June 30, 1906, is published below, being the finished bill, containing all amendments, alterations, etc., to May 1st, 1914, made by the conference committee of the House and Senate, official text.

An act for preventing the manufacture, sale or transportation of adulterated or misbranded or poisonous or deleterious foods, drugs, medicines and liquors, and for regulating traffic therein and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it shall be unlawful for any person to manufacture, sell, or offer for sale within any Territory or the District of Columbia, or deliver for shipment, or to cause to be delivered, shipped or transported from within any State, Territory, or District of Columbia to any State, Territory or District of Columbia, or foreign country, any article of food, drugs, medicines or liquors which is adulterated or misbranded, or which contains any poisonous or deleterious substance within the meaning of this Act; and any person who shall violate any of the provisions of this section shall be guilty of a misdemeanor, and for each offense shall, upon conviction thereof, be fined not to exceed five hundred dollars or shall be sentenced to one year's imprisonment, or both such fine and imprisonment, in the discretion of the court, and for each subsequent offense and conviction thereof shall be fined not less than one thousand dollars or sentenced to one year's imprisonment, or both such fine and imprisonment, in the discretion of the court.

SEC. 2. That the introduction into any State or Territory or the District of Columbia from any other State or Territory or the District of Columbia, or from any foreign country, or shipment to any foreign country of any article of food or drugs which is adulterated or misbranded, within the meaning of this Act, is hereby prohibited; and any person who shall ship or deliver for shipment from any State or Territory or the District of Columbia to any other State or Territory or the District of Columbia, or to a foreign country, or who shall receive in any State or Territory or the District of Columbia from any other State or Territory or the District of Columbia or foreign country, and having so received, shall deliver, in original unbroken packages, for pay or otherwise, or offer to deliver to any other person any such article so adulterated or misbranded within the meaning of this Act, or any person who shall sell or offer for sale in the District of Columbia or the Territories of the United States any such adulterated or misbranded foods or drugs, or offer to export the same to any foreign country, shall be guilty of a misdemeanor, and for such offense be fined not exceeding two hundred dollars for the first offense, and upon conviction for each subsequent offense not exceeding three hundred dollars or be imprisoned not exceeding one year, or both, in the discretion of the court. Provided, That no article shall be deemed misbranded or adulterated within the provision of this Act when intended for export to any foreign country and prepared or packed according to the specifications or directions of the

foreign purchaser when no substance is used in the preparation or packing thereof in conflict with the laws of the foreign country to which said article is intended to be shipped; but if said article shall be in fact sold or offered for sale for domestic use or consumption, then this proviso shall not exempt said article from the operation of any of the other provisions of this Act.

UNIFORM RULES BY VARIOUS AUTHORITIES.

SEC. 3. That the Secretary of the Treasury, the Secretary of Agriculture and the Secretary of Commerce and Labor make uniform rules and regulations for carrying out the provisions of this Act, including the collection and examination of specimens of foods and drugs manufactured or offered for sale in the District of Columbia, or in any Territory of the United States, or which shall be offered for sale in unbroken packages in any State other than that in which they shall have been respectively manufactured or produced, or which shall be received from any foreign country, or intended for shipment to any foreign country, or which may be submitted for examination by the chief health food or drug officer of any State, Territory or the District of Columbia, or at any domestic or foreign port through which such product is offered for interstate commerce, or for export or import between the United States and any foreign port or country.

SEC. 4. That the examination of specimens of foods and drugs shall be made in the Bureau of Chemistry of the Department of Agriculture, or under the direction and supervision of such bureau for the purpose of determining from such examinations whether such articles are adulterated or misbranded within the meaning of this Act; and if it shall appear from any such examination that any such specimens are adulterated or misbranded within the meaning of this Act, the Secretary of Agriculture shall cause notice thereof to be given to the party from whom such sample was obtained. Any party so notified will be given an opportunity to be heard, under such rules and regulations as may be prescribed as aforesaid, and if it appears that any of the provisions of this Act have been violated by such party, then the Secretary of Agriculture shall at once certify the facts to the proper United States district attorney, with a copy of the results of the analysis or the examination of such article duly authenticated by the analyst or officer making such examination, under oath of such officer. After judgment of the court, notice shall be given by publication in such manner as may be prescribed by the rules and regulations aforesaid.

SEC. 6. That the term "drug," as used in this Act, shall include all medicines and preparations recognized in the United States Pharmacopœia or National Formulary for internal or external uses, and any substance or mixture of substances intended to be used for the cure, mitigation or prevention of disease of either man or other animals. The term "food," as used herein, shall include all articles used for food, drink, confectionery or condiment by man or other animals, whether simple, mixed or compounded.

WHEN ARTICLE SHALL BE DEEMED ADULTERATED.

SEC. 7. That for the purpose of this Act an article shall be deeemd to be adulterated:

IN CASE OF DRUGS:

First. If, when a drug is sold under or by a name recognized in the United States Pharmacopæia or National Formulary, it differs from the standard of strength, quality or purity, as determined by the test laid down in the United States Pharmacopœia or National Formulary official at the time of investigation. Provided, That no drug defined in the United States Pharmacopœia or National Formulary shall be deemed to be adulterated

under this provision if the standard of strength, quality or purity be plainly stated upon the bottle, box or other container thereof, although the standard may differ from that determined by the test laid down in the United States Pharmacopœia or National Formulary.

Second. If its strength or purity fall below the professed standard or quality under which it is sold.

IN THE CASE OF CONFECTIONERY:

If it contains terra alba, barytes, talc, chrome yellow, or other mineral substance or poisonous color or flavor, or other ingredient deleterious or detrimental to health, or any vinous, malt or spirituous liquor or compound or narcotic drug.

IN THE CASE OF FOOD:

First: If any substance has been mixed and packed with it so as to reduce or lower or injuriously affect its quality or strength.

Second. If any substance has been substituted wholly or in part for the article.

Third. If any valuable constituent of the article has been wholly or in part abstracted.

Fourth. If it be mixed, colored, powdered, coated or stained in a manner whereby damage or inferiority is concealed.

Fifth. If it contain any added poisonous or other added deleterious ingredient which may render such article injurious to health. Provided, That when in the preparation of food products for shipment they are preserved by an external application applied in such manner that the preservative is necessarily removed mechanically, or by maceration, in water or otherwise, and directions for the removal of said preservative shall be printed on the covering or the package, the provisions of this Act shall be construed as applying only when said products are ready for consumption.

Sixth. If it consists in whole or in part of a filthy, decomposed or putrid animal or vegetable substance, or any portion of an animal unfit for food whether manufactured or not, or if it is the product of a diseased animal, or one that has died otherwise than by slaughter.

SEC. 8. That the term "misbranded," as used herein, shall apply to all drugs or articles of food, or articles which enter into the composition of food, the package or label of which shall bear any statement, design, or device regarding such article, or the ingredients or substances contained therein shall be false or misleading in any particular, and to any food or drug product which is falsely branded as to the State, Territory or country in which it is manufactured or produced.

WHEN ARTICLES SHALL BE DEEMED MISBRANDED.

That for the purposes of this Act an article also shall be deemed to be misbranded:

IN CASE OF DRUGS:

First. If it be an imitation of or offered for sale under the name of another article.

Second. If the contents of the package as originally put up shall have been removed, in whole or in part, and other contents shall have been placed in such package, or if the package fail to bear a statement on the label of the quantity or proportion of any alcohol, morphine, opium, cocaine, heroine, alpha or beta eucaine, chloroform, cannabis indica, chloral hydrate or acetanilid, or any derivative or preparation of any substances contained therein.

IN CASE OF FOOD:

First. If it be an imitation of or offered for sale under the distinctive name of another article.

Second. If it be labeled or branded so as to deceive or mislead the purchaser, or purport to be a foreign product when not so, or if the contents of the package as originally put up shall have been removed in whole or in part and other contents shall have been placed in such package, or if it fail to bear a statement on the label of the quantity or proportion of any morphine, opium, cocaine, heroine, alpha or beta eucaine, chloroform, cannabis indica, chloral, hydrate, or acetanilid, or any derivative or preparation of any of any such substances contained therein.

Third. If in package form and the contents are stated in terms of weight or measure, they are not plainly and correctly stated on the outside of the package.

(See Weight or Measure Branding Laws at back of this book.)

Fourth. If the package containing it or its label shall bear any statement, design or device regarding the ingredients of the substances contained therein, which statement, design or device shall be false or misleading in any particular. Provided, That an article of food which does not contain any added poisonous or deleterious ingredients shall not be deemed to be adulterated or misbranded in the following cases:

First. In the case of mixtures or compounds which may be now or from time to time hereafter known as articles of food, under their own distinctive names, and not an imitation of or offered for sale under the distinctive name of another article, if the name be accompanied on the same label or brand with a statement of the place where said article has been manufactured or produced.

Second. In the case of articles labeled, branded or tagged, so as to plainly indicate that they are compounds or blends, and the word "compound," "imitation," or "blend," as the case may be, is plainly stated on the package in which it is offered for sale. Provided, That the term blend as used herein shall be construed to mean a mixture of like substances, not excluding harmless coloring or flavoring ingredients used for the purpose of coloring and flavoring only. And provided further, That nothing in this Act shall be construed as requiring or compelling proprietors or manufacturers of proprietary foods which contain no unwholesome added ingredient to disclose their true formulas, except in so far as the provisions of this Act may require to secure freedom from adulteration or misbranding.

THE GUARANTY.

SEC. 9. That no dealer shall be prosecuted under the provisions of this Act when he can establish a guaranty signed by the wholesaler, jobber, manufacturer or other party residing in the United States from whom he purchases such articles to the effect that the same is not adulterated or misbranded within the meaning of this Act, designating it. Said guaranty, to afford protection, shall contain the name and address of the party or parties making the sale of such articles to such dealer, and in such case said party or parties shall be amenable to the prosecutions, fines and other penalties which would attach, in due course, to the dealer under the provisions of this Act.

SEC. 10. That any article of food, drug or liquor that is adulterated or misbranded within the meaning of this Act and is being transported from one State, Territory, District of Columbia or insular possession to another for sale, or having been transported, remains unloaded, unsold, or in original unbroken packages, or if it be sold or offered for sale in the District of Columbia, or in the Territories or insular possessions of the United States; or

if it be imported from a foreign country for sale, or if it is intended for export to a foreign country, shall be liable to be proceeded against in any district court of the United States within the District where the same is found and seized for confiscation by a process of libel for condemnation. And if such article is condemned as being adulterated or misbranded, or of a poisonous or deleterious character, within the meaning of this Act, the same shall be disposed of by destruction or sale, as the said court may direct, and the proceeds thereof, if sold, less the legal costs and charges, shall be paid into the Treasury of the United States, but such goods shall not be sold in any jurisdiction contrary to the provisions of this Act or the laws of that jurisdiction. Provided, however, that upon the payment of the costs of such libel proceedings and the execution and delivery of a good and sufficient bond to the effect that such articles shall not be sold or otherwise disposed of contrary to the provisions of this Act or the laws of any State, Territory, District of Columbia or insular possession, the court may by order direct that such articles be delivered to the owner thereof. The proceedings of such libel cases shall conform, as near as may be, to the proceedings in admiralty, except that either party may demand trial by jury of any issue of fact joined in any such case, and all such proceedings shall be at the suit of and in the name of the United States.

DELIVERY OF SAMPLES OF IMPORTED GOODS.

SEC. 11. The Secretary of the Treasury shall deliver to the Secretary of Agriculture, upon his request from time to time, samples of foods and drugs which are being imported into the United States or offered for import, giving notice thereof to the owner or consignee, who may appear before the Secretary of Agriculture and have the right to introduce testimony, and if it appear from the examination of such samples that any article of food or drug offered to be imported into the United States is adulterated or misbranded within the meaning of this Act, or is otherwise dangerous to the health of the people of the United States, or is of a kind forbidden entry into or forbidden to be sold or restricted in sale in the country in which it is made or from which it is exported, or is otherwise falsely labeled in any respect, the said article shall be refused admission, and the Secretary of the Treasury shall refuse delivery to the consignee and shall cause the destruction of any goods refused delivery which shall not be exported by the consignee within three months from the date of notice of such refusal under such regulations as the Secretary of the Treasury may prescribe. Provided, That the Secretary of the Treasury may deliver to the consignee such goods pending the examination and decision in the matter on execution of a penal bond for the amount of the full invoice value of such goods, together with the duty thereon, and on refusal to return such goods for any cause to the custody of the Secretary of the Treasury, when demanded, for the purpose of excluding them from the country, or for any other purpose, said consignee shall forfeit the full amount of the bond. And provided further, That all charges for storage, cartage and labor on goods which are refused admission or delivery shall be paid by the owner or consignee, and in default of such payment shall constitute a lien against any future importation made by such owner or consignee.

SEC. 12. That the term "Territory" as used in this Act shall include the insular possessions of the United States. The word "person" as used in this Act shall be construed to impart both the plural and singular, as the case demands, and shall include corporations, companies, societies and associations. When construing and enforcing the provisions of this Act, the act, omissions or failure of any officer, agent or other person acting for or employed by any corporation, company, society or association within the scope of his employment or office, shall in every case be also deemed to be the act, omission or failure of such corporation, company, society or association, as well as that of the person.

SEC. 13. That this Act shall be in force and effect from and after the first day of January, nineteen hundred and seven.

Weight or Measure Branding Laws

NATIONAL.

The amendment of March 3, 1913, to the food and drugs act of June 30, 1906, provides that food in package form must be labeled to show the quantity of contents in terms of weight, measure or numerical count. The regulations for the enforcement of this amendment are now being formulated.

This law does not apply to domestic products prepared or foreign products imported prior to September 3, 1914.

CALIFORNIA.

The Act 1913, chapter 167, provides that all food products sold in a container must be labeled to show the weight, measure or numerical count of contents. The law defines a container to be the receptacle in which the commodity is packed for sale or expose sale. Designation shall be in weight, measure or count, as is most feasible according to the character of the product, and if by weight must be in terms of pounds, ounces or fractions avoirdupois; if by liquid measure, in terms of gallons, quarts, pints or fractions thereof; and if by solid measure, in terms of bushels, pecks, quarts or fractions thereof; if by count, shall be expressed in English words of Arabic numerals. In stating the contents, one of the following phrases shall appear: "Net Contents." "Net Weight," "Net Measure," or "Net Count." Unavoidable discrepancies are not to be held a violation of the Act, nor is it a violation, if there is a discrepancy, provided the seller of the article purchased the container in good faith, relying upon the statement of the contents in the container, provided, further, that the name of the packer, manufacturer, wholesaler or jobber appears upon the container.

This law took effect April 1st, 1914.

CONNECTICUT.

The Connecticut law now in effect requires all food products in package form, except confectionery and shelled nuts, sold for 10 cents or less, to be labeled to show the weight, measure or numerical count, with allowance for reasonable variations, under rules and regulations made from time to time by the dairy and food commissioner and the director of the Connecticut experiment station.

This law is now in effect, and by a ruling of the courts the term "package" has been construed to cover such things as cases of bottles. Therefore, under the Connecticut law, canned foods designated for sale in that state should be marked or stenciled in a way to show the net contents of the cans enclosed.

FLORIDA.

Under the law now in effect it is necessary to state the weight, measure or numerical count of contents on all food products sold in package form. Reasonable variations are permitted. The regulations provide that the net weight shall be stated in pounds or ounces, avoirdupois, and that the net measure shall be stated in U. S. standard gallons, quarts or fluid ounces. Packages containing more than a pound shall state the weight in pounds and ounces; weights less than a pound shall be stated in ounces. It is not permissible to state a pound or more in ounces or one quart or more in fluid ounces.

IOWA.

The act taking effect September 3, 1914, requires that food products in package form shall be labeled to show the weight, measure or numerical count of contents. Reasonable variations are permitted.

MAINE.

Under the Maine law canned foods must be labeled to show the quantity of contents in terms of weight, measure or numerical count. Reasonable variations are permitted.

MICHIGAN.

Food products in package form are required to bear upon the principal label a statement of the true net weight in terms of pounds, ounces and grains avoirdupois, or true net measure, in terms of gallons of 231 cu. in., or fractions thereof, and quarts, pints and gills, or true numerical count. Reasonable variations are permitted.

MONTANA.

All commodities, including food products in package or container when sold or offered for sale, must be labeled with a correct statement of the weight, measure or numerical count. In determining whether or not the correct weight is stated, the usual leakage, evaporation or waste shall be taken into consideration. A variation of 3 per cent. from the stated weight is allowed, provided the variation is as often above as below the weight stated.

These provisions took effect January 1, 1914.

NEBRASKA.

Beginning March 4, 1914, all food products in package form must be labeled to show the weight, measure or numerical count of the contents. Reasonable variations are permitted with the same proviso as in the Montana law.

NEVADA.

All commodities in package form, including food products, must be labeled with the weight, measure or numerical count of the contents. A slight variation is permissible when the same is as often above as below the weight stated, and the ordinary evaporation, leakage or waste shall be considered in determining whether or not the statement of weight is true.

This law is now in effect.

NEW HAMPSHIRE.

The Act taking effect November 22, 1914, requires all food products in package form to be labeled to show the weight, measure or numerical count of contents. Reasonable variations are permitted.

NEW YORK.

All commodities sold in containers must be labeled to show the weight, measure or numerical count. Reasonable variations are permitted. The size of type to be used in marking the weight is prescribed by regulation, as follows: In type at least 1-9 inch in height where the weight of contents is in ¼ lb., ½ lb. or multiples of ½ lb.; otherwise in type at least 3-16 of an inch in height. The statute went into full effect February 1, 1914.

NORTH DAKOTA.

All food products in package form must be labeled with the weight. Reasonable variations are permitted. The law is now in effect.

OREGON.

Food products in package form must be labeled to show the weight, measure or numerical count. Variations are permitted. The statute takes effect July 1, 1914.

PENNSYLVANIA.

The law approved by the Governor about July 24, 1913, provides that every commodity or article of food packed in containers of any description shall bear a plainly legible statement of the net weight, measure or numerical count of contents or of the net volume thereof, and the name and address of the manufacturer, producer or distributor. Reasonable variations to be established by the Chief of the Bureau of Standards are permitted.

The act becomes effective eighteen months after its approval (January, 1915.)

SOUTH DAKOTA.

The law now in effect provides that all food products sold in package form, bottle or container, must be labeled to show the weight, measure or numerical count. Variations are permitted.

UTAH.

All food products in packages must be labeled with the weight, measure or numerical count. Reasonable variations are permitted. This law was passed in 1913, to take immediate effect.

WISCONSIN.

Foods in package form must be labeled to show the weight, measure or numerical count. Reasonable variations are permitted. This act takes effect September 3, 1914.

WYOMING.

Food products in package form must be labeled with the weight, measure or numerical count. Reasonable variations are permitted. The act is now in effect.



Recommended Weights for Canned Food Labels

The following weights for use on labels, in compliance with the weight laws, have been recommended by the National Canners' Association. It must be understood that these have been purposely put slightly below the actual weight in the cans, so as to be on the safe side. You will be prosecuted for a claim of overweight, but never for one of underweight. *Do not use these weights as a guide for filling cans.*

TO BE STATED IN POUNDS AND OUNCES.

	Ounces
APPLES.	
No. 3—4⅞ inch	29
No. 10	94
No. 2	
No. 8	86
No. 2½	26
APPLE SAUCE.	
No. 10	107
No. 2½	29
APPLE BUTTER.	
No. 3—4⅞ in.	33
No. 3—5 in.	33
No. 2	32
No. 1	11
ASPARAGUS.	
No. 1 (all kinds)	15
No. 2½	30
No. 3	32
No. 8	98
No. 2	19
ASPARAGUS.	
No. 2 Flat	18
No. 10	95
No. 3 Square	42
BEANS.	
(Wax and Refugee.)	
No. 1	11
No. 1½	14
No. 2	19
No. 3—4⅞ in.	31
No. 3—5 in.	32
No. 10	102
No. 8	98
(Red Kidney.)	
No. 1	10
No. 2	20
No. 3—4⅞ in.	32
No. 10	107

	Ounces
(Lima.)	
No. 1	11
No. 1½	14
No. 2	20
No. 10	109
(Baked.)	
No. 3—4⅞ in.	34
No. 1	
No. 2	
No. 10	
PORK AND BEANS.	
No. ½	6
No. 1	11
No. 2	21
No. 3—4⅞ in.	34
No. 10	110
No. 0	9
BEETS.	
No. 2	20
No. 2—4⅞ in. and 5 in.	33
No. 10	100
CAULIFLOWER.	
No. 3	
CABBAGE.	
No. 3	
OKRA.	
No. 2	18
No. 3	32
OKRA AND TOMATOES.	
No. 2	18
No. 3	32
CORN.	
No. 1	11
No. 2	20
No. 10	
SUCCOTASH.	
No. 1	11
No. 2	20
No. 10	105

	Ounces
Peas.	
No. 1	11
No. 1½	15
No. 2	20
No. 8	
No. 10	108
Individual	
Pumpkin.	
No. 2	19
No. 3—4⅞ in.	33
No. 35½	37
No. 10	104
No. 2½	30
Squash.	
No. 3—4⅞ in.	33
No. 10	
Sauer Kraut.	
No. 2	2
No. 2½	29
No. 3—4⅞ in.	
No. 10	
Rhubarb.	
No. 2½	31
No. 10	100
Spinach.	
No. 2	18
No. 2½	25
No. 3—4⅞ in.	30
No. 3—5 in.	30
No. 3—5 1-3 in	36
No. 10	100
Individual	
Sweet Potatoes.	
No. 3—4⅞ in.	31
No. 3—5 in.	32
No. 10	100
Tomatoes.	
No. 2	19
No. 2½	28
No. 3—4⅞ in.	32
No. 3—5 in.	33
No. 3—5 1-3	37
No. 10	103
No. 8	100
No. 1	
No. 1½	
No. 9	
Individual	
Hominy.	
No. 2½	31
No. 3—4⅞ in.	32
No. 10	107
No. 3—5⅛ in.	36

	Ounces
Blackberries.	
No. 2	21
No. 2½	30
No. 10	104
No. 3	
Blueberries.	
No. 2	19
No. 10	108
Currants.	
No. 10	
Cherries.	
No. 2	20
No. 2½	30
No. 8	100
No. 10	105
Figs.	
No. ¾	
No. 1½	19
Individual	
Gooseberries.	
No. 1	
No. 2	20
No. 2½	32
No. 10	103
Apricots.	
No. 2½	29
No. 8	100
Peaches.	
No. 1	10
No. 1½ Flat	19
No. 2	
No. 2½	29
No. 3—4⅞ in.	32
No. 8	100
No. 10	102
Peach Butter.	
No. 2	20
Pears.	
No. 2	20
No. 2½	30
No. 3—4⅞ in.	32
No. 8	100
No. 10	104
Plums.	
No. 2	22
No. 2½	29
No. 3—4⅞ in.	33
No. 8	100
No. 10	106

	Ounces
Pineapple.	
No. 1 Buffet	9
No. 2 Flat	18
No. 2 Tall	21
No. 2	20
No. 2½	31
No. 3—4⅞ in.	31
No. 8	90
Raspberries.	
No. 2	21
No. 2½	30
No. 10	106
Loganberries.	
No. 2	21
No. 10	100
Strawberries.	
No. 2	20
No. 1	11
No. 2½	28
No. 10	100
Grapes.	
No. 2½	28
No. 8	100
Elderberries.	
No. 3—5 in.	
Prunes.	
No. 2	20
Spaghetti.	
No. 1	11
No. 2	21
Chili Con Carne.	
No. 1	10
Ripe Olives.	
1 Pound	
Tall Pints	
No. 2½	
No. 2½ Tall	
No. 10	

	Ounces
Soups.	
No. 1	10½
No. 10	112
Salmon.	
No. 1 Tall, Flat and Oval	15½
No. ½	8
Shrimp.	
No. 1 Wet and Dry	4
No. 1½	8
Lobster.	
No. ¼	
No. ½	
No. 1	
No. 10 oz. Tall	
Sardines.	
No. ¾	11
No. ¼	3½
Milk.	
Baby	6
Family	11
Tall	15
Hotel	35
No. 10	120
Clams.	
No. 1	
No. 2	
Oysters.	
2 11-16x2 3-4 (3 oz.)	3
2 11-16x3 3-8 (4 oz.)	4
No. 1 2 11-16x4	5
3 3-8x3 5-16 (6 oz.)	6
3 3-8x3 15-16 (8 oz.)	8
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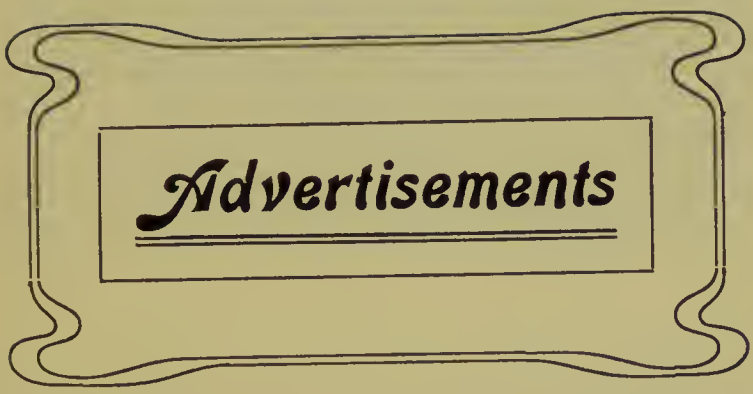
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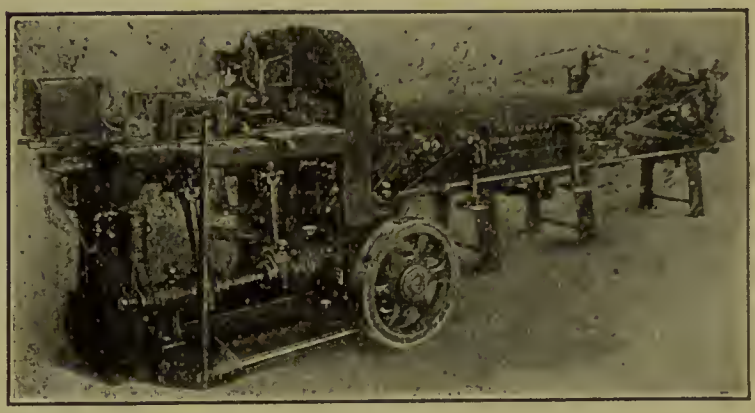
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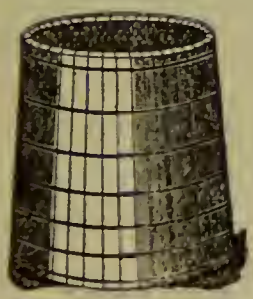
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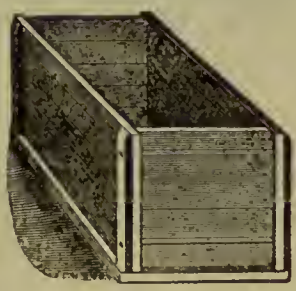
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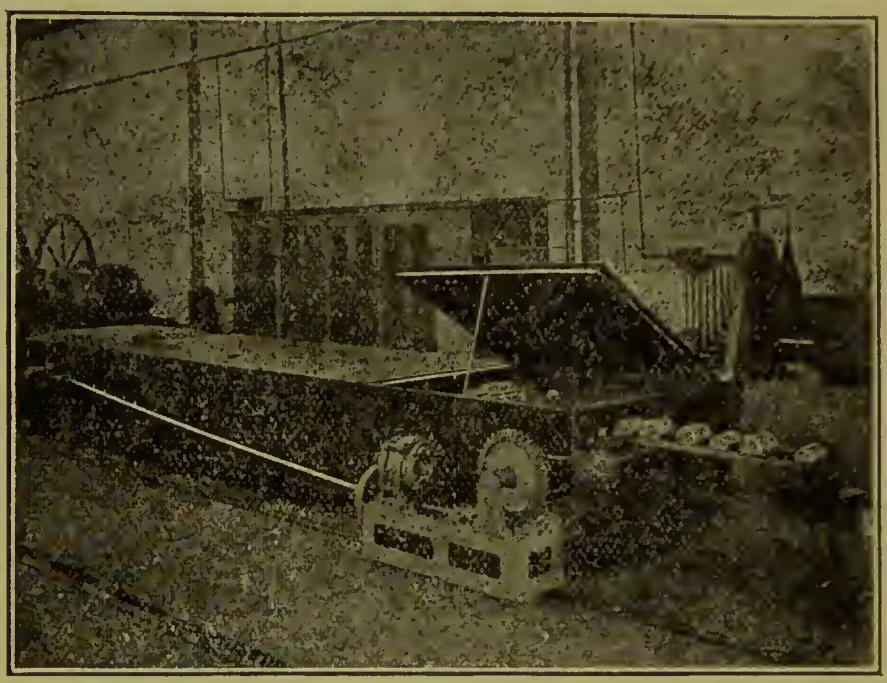
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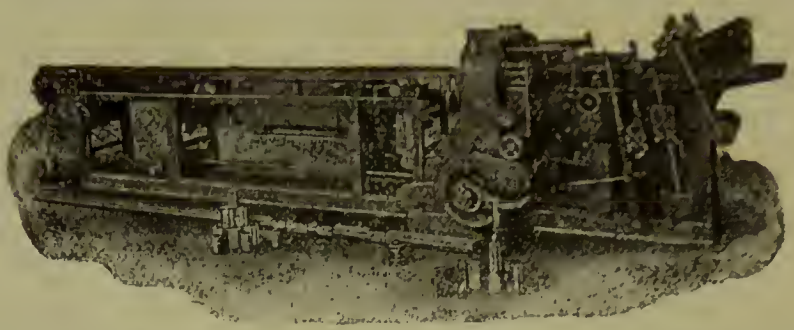
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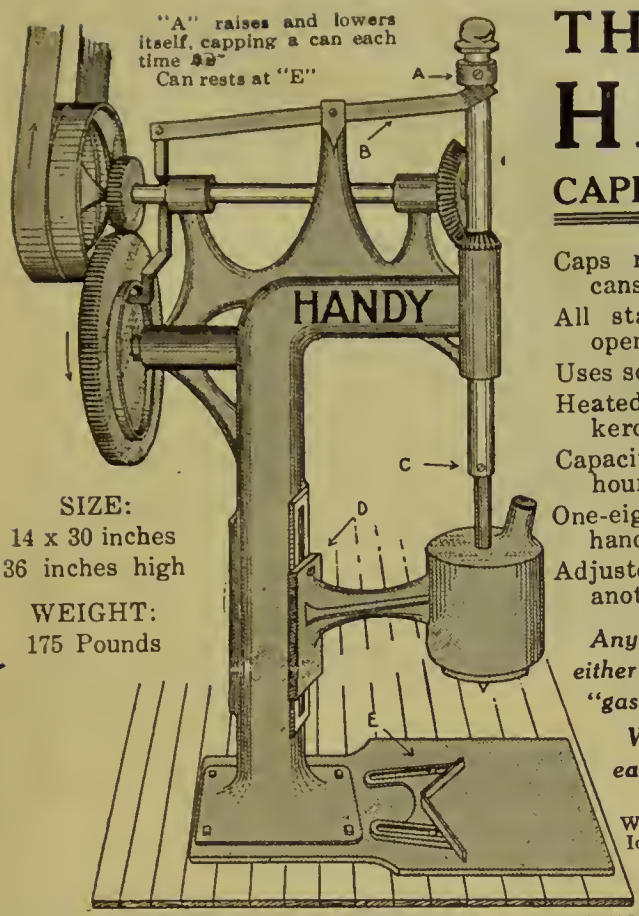
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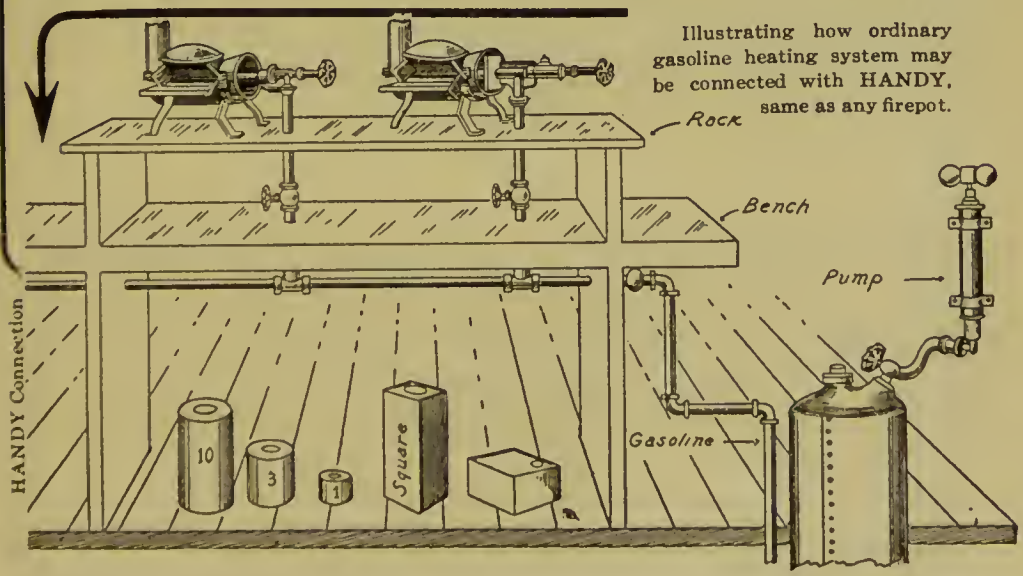
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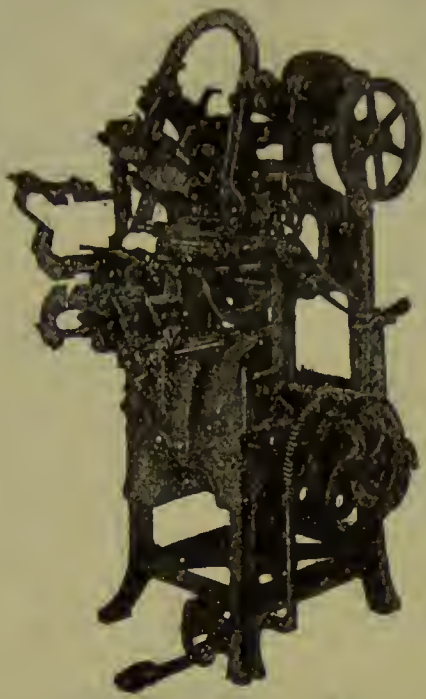
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COAL BUNKERS

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24'×48' - 2 STORY

GROUND FLOOR FOR ENGINE, DYNAMO, PUMP, MACHINE SHOP AND STORAGE FOR UNUSED MACHINES

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CONTINUOUS STEAM EXHAUST 2'×24'

CAPPER AND WIPER 4'6"×20'6"

CAN TESTER 1'×12'

CONTINUOUS STEAM EXHAUST 2'×24'

CAPPER AND WIPER 4'6"×20'6"

CAN TESTER 1'×12'

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